



# DEPARTMENT OF TERRESTRIAL MAGNETISM J. A. Fleming, Director

Scientific Results of Cruise VII of the CARNEGIE during 1928-1929 under Command of Captain J. P. Ault

### BIOLOGY-V

# The Genus Ceratium in the Pacific and North Atlantic Oceans

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Of the 110,000 nautical miles planned for the seventh cruise of the nonmagnetic ship Carnegie of the Carnegie Institution of Washington, nearly one-half had been completed on her arrival at Apia, November 28, 1929. The extensive program of observation in terrestrial magnetism, terrestrial electricity, chemical oceanography, physical oceanography, marine biology, and marine meteorology was being carried out in virtually every detail. Practical techniques and instrumental appliances for oceanographic work on a sailing vessel had been most successfully developed by Captain J. P. Ault, master and chief of the scientific personnel, and his colleagues. The high standards established under the energetic and resourceful leadership of Dr. Louis A. Bauer and his coworkers were maintained, and the achievements which had marked the previous work of the Carnegie extended.

But this cruise was tragically the last of the seven great adventures represented by the world cruises of the vessel. Early in the afternoon of November 29, 1929, while she was in the harbor at Apia completing the storage of 2000 gallons of gasoline, there was an explosion as a result of which Captain Ault and cabin boy Anthony Kolar lost their lives, five officers and seamen were injured, and the vessel with all her equipment was destroyed.

In 376 days at sea nearly 45,000 nautical miles had been covered (see map, p. iv). In addition to the extensive magnetic and atmospheric-electric observations, a great number of data and marine collections had been obtained in the field of chemistry, physics, and biology, including bottom samples and depth determinations. These observations were made at 162 stations, at an average distance apart of 300 nautical miles. The distribution of these stations is shown in the map, which delineates also the course followed by the vessel from Washington, May 1, 1928, to Apia, November 28, 1929. At each station, salinities and temperatures were obtained at depths of 0, 5, 25, 50, 75, 100, 200, 300, 400, 500, 700, 1000, 1500, etc., meters, down to the bottom or to a maximum of 6000 meters, and complete physical and chemical determinations were made. Biological samples to the number of 1014 were obtained both by net and by pump, usually at 0, 50, and 100 meters. Numerous physical and chemical data were obtained at the surface. Sonic depths were determined at 1500 points and bottom samples were obtained at 87 points. Since, in accordance with the established policy of the Department of Terrestrial Magnetism, all observational data and materials were forwarded regularly to Washington from each port of call, the records of only one observation were lost with the ship, namely, a depth determination on the short leg between Pago Pago and Apia.

The compilations of, and reports on, the scientific results obtained during this last cruise of the <u>Carnegie</u> are being published under the classifications Physical Oceanography, Chemical Oceanography, Meteorology, and Biology, in a series numbered, under each subject,

I, II, and III, etc.

A general account of the expedition has been prepared and published by J. Harland Paul, ship's surgeon and observer, under the title <u>The last cruise of the Carnegle</u>, and contains a brief chapter on the previous cruises of the <u>Carnegle</u>, a description of the vessel and her equipment, and a full narrative of the cruise (Baltimore, Williams and Wilkins Company, 1932; xiii + 331 pages with 198 illustrations).

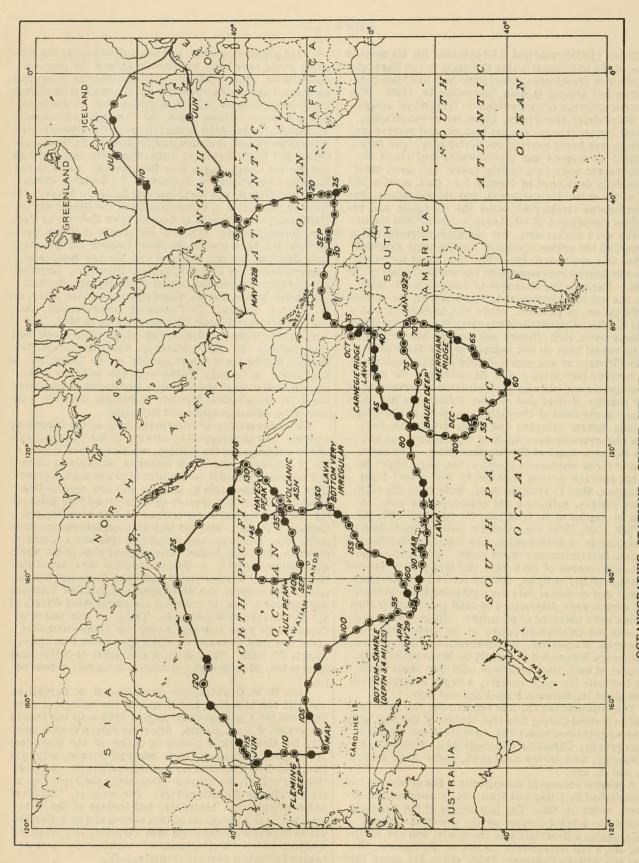
The preparations for, and the realization of, the program would have been impossible without the generous cooperation, expert advice, and contributions of special equipment and books received on all sides from interested organizations and investigators both in America and in Europe. Among these, the Carnegie Institution of Washington is indebted to the following: the United States Navy Department, including particularly its Hydrographic Office and Naval Research Laboratory; the Signal Corps and the Air Corps of the War Department; the National Museum, the Bureau of Fisheries, the Weather Bureau, the Coast Guard, and the Coast and Geodetic Survey; the Scripps Institution of Oceanography of the University of California; the Museum of Comparative Zoölogy of Harvard University; the School of Geography of Clark University; the American Radio Relay League; the Geophysical Institute, Bergen, Norway; the Marine Biological Association of the United Kingdom, Plymouth, England; the German Atlantic Expedition of the Meteor, Institut für Meereskunde, Berlin, Germany; the British Admiralty, London, England; the Carlsberg Laboratorium, Bureau International pour l'Exploration de la Mer, and Laboratoire Hydrographique, Copenhagen, Denmark; and many others. Dr. H. U. Sverdrup, now Director of the Scripps Institution of Oceanography of the University of California, at La Jolla, California, who was then a Research Associate of the Carnegie Institution of Washington at the Geophysical Institute at Bergen, Norway, was consulting oceanographer and physicist.

In summarizing an enterprise such as the magnetic, electric, and oceanographic surveys of the Carnegie and of her predecessor the Galilee, which covered a quarter of a century, and which required cooperative effort and unselfish interest on the part of many skilled scientists, it is impossible to allocate full and appropriate credit. Captain W. J. Peters laid the broad foundation of the work during the early cruises of both vessels, and Captain J. P. Ault, who had had the good fortune to serve under him, continued and developed that which Captain Peters had so well begun. The original plan of the work was envisioned by L. A. Bauer, the first Director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington; the development of suitable methods and apparatus was the result of the painstaking efforts of his co-workers at Washington. Truly, as was stated by Captain Ault in an address during the commemorative exercises held on board the Carnegie in San Francisco, August 26, 1929, "The story of individual endeavor and enterprise, of invention and accomplishment, cannot be

told.'

Dr. H. W. Graham, who succeeded H. R. Seiwell as chemist and biologist, had charge of the biological work on board the <u>Carnegie</u> from August 1929 until the loss of the vessel at Apia, Samoa. After his return to this country, Dr. Graham was placed in charge of the biological collections, attending to their subsequent care, segregation, and distribution to various specialists for examination and report, he himself undertaking the reporting of the Peridineae (Dinoflagellata). His memoir, "Studies in the morphology, taxonomy, and ecology of the Peridiniales," is Biology-III of this series and in it Ceratium is briefly discussed. He also examined and prepared a report on the "Phytoplankton," which is the first of twelve biological reports in Biology-IV.

The present report discusses a single peridinian --



(At the 35 stations marked • true sea-water samples were also obtained for salinity calibrations) OCEANOGRAPHIC STATIONS, CRUISE VII OF THE CARNEGIE, 1928-29

PREFACE

genus Ceratium of the family Ceratiaceae. Dr. Graham was assisted in the laboratory work necessary for the present volume by Mrs. Natalia Bronikovsky, who did the careful microscopic work which the dinoflagellate investigations demand.

The genus Ceratium is distributed over all the oceans of the world and is one of the most valuable genera of the peridinians for distributional studies. Not only are there cold- and warm-water species, but many species show minor phenotypic variations which are useful in tracing dynamic conditions. Fifty-eight species of this genus were found in the <u>Carnegie</u> material and are discussed here. Distributional and environmental data for these different species are given in the appendix tables (pp. 47-161) and charts (pp. 187-207) whenever such information is available.

The area traversed by the <u>Carnegie</u> was divided into five regions on the basis of Ceratium floras (chart 45). Two of these regions are in the North Atlantic and three are in the Pacific Ocean. They are also characterized by particular hydrographic conditions.

This manuscript was completed by Dr. Graham in 1938. Thus some papers printed since then are not con-

dered.

The present volume is the eleventh in the series "Scientific results of cruise VII of the <u>Carnegie</u> during 1928-1929 under the command of Captain J. P. Ault." This is the fifth of the Biological Reports.

J. A. Fleming
Director, Department of Terrestrial Magnetism

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## THE GENUS CERATIUM IN THE PACIFIC AND NORTH ATLANTIC OCEANS

#### INTRODUCTION

The present paper, which constitutes a part of the <u>Carnegie</u> plankton reports, deals only with the one peridinian--(dinoflagellate) genus Ceratium. This genus consists of a large number of species of which many are very common and widespread marine forms. They constitute a characteristic and often dominant part of the planktonic community. The present report deals with fifty-eight species, which comprise all but one or two of the known marine forms as well as three new species.

Because of their constant participation in the marine phytoplankton, the Ceratia have of late been given considerable attention in general oceanographic researches. Thus, Peters (1934) has investigated the distribution and biology of the Ceratia collected by the Meteor during its intensive oceanographic investigation of the South Atlantic Ocean in 1925 to 1927 and Nielsen (1934) has done likewise for the collections of the Dana made in the South Pacific during 1928 to 1930. The present collections are unique in their extensive nature, bringing together comparable material from widely separated regions of the Pacific and North Atlantic oceans. In the Atlantic the stations extended along the Gulf

Stream or North Atlantic West Wind Drift, in the North Sea, in the arctic currents about Iceland and Greenland, and in the Labrador Current. There is also a line extending through the Sargasso Sea to the North Equatorial Current and Equatorial Countercurrent. From here there are stations running along the former current and into the Caribbean Sea.

In the Pacific the collections are even more extensive. There are two lines crossing the equatorial currents; one in the central Pacific between longitudes 140° and 150° west, the other west of this at about longitude 175° west. Tropical stations in the North Pacific are scattered widely over the east and west parts; north of the Marshall Islands, between Guam and Japan; between the United States and Hawaii; and north and south of Hawaii. In the South Pacific there is a line of stations in a region of indefinite currents between Peru and Samoa. There are stations from Peru southeastward at 40° south latitude and north to Easter Island. Other stations are in the region of the Galapagos Islands and the Panamic area.

#### THE HYDROGRAPHY OF THE REGIONS INVESTIGATED

#### Currents

North Atlantic Ocean .-- The central part of the North Atlantic surface water consists of a huge vortex running clockwise. The southern part of this circuit is represented by the North Equatorial Current which has a westerly course and is composed of water of high temperature and low nutrient content. This current merges with the Florida Current which has a northerly set off the east coast of the United States. It, too, is composed of warm, nutrient-poor water. This current, in turn, becomes the North Atlantic West Wind Drift which flows eastward to the coast of Europe. This current loses its tropical characteristics as it progresses, becoming colder and richer in nutrient salts. When it reaches Europe, some of this water is deflected to the south to join the North Equatorial Current, and thus to resume the circuit; other parts continue northeastward around the British Isles and finally into the Arctic Ocean. To the north of the West Wind Drift there is a general movement of arctic water southward, more specifically in the form of the Greenland Current and the Labrador Current. This cold. nutrient-rich water meets the warm water to the south at the polar front (subpolar convergence) which lies at about latitude 40° north off the coast of America, and from there extends west northwestward (see chart 50). The surface temperatures at this convergence drop suddenly from 21° to 11° C. It should also be noted that

within the North Atlantic West Wind Drift there is a sudden drop in temperature and increase in nutrients at about  $40^{\circ}$  west longitude. Although the <u>Carnegie</u> stations are rather widely separated in this region, the change is striking, with a surface temperature of  $21.^{\circ}18$  recorded at station 14 and  $15.^{\circ}50$  at station 3. Similarly the phosphate content of the upper 50 meters increased from 14 to 64 mg  $PO4/m^3$ . In addition to the above stations there were four stations in the Caribbean Sea. The water here was the warmest of any Atlantic region visited, with temperatures all above  $28^{\circ}$  C, and it was practically devoid of phosphate.

North Pacific Ocean. -- The main body of the North Pacific is involved in a clockwise rotation similar to that in the North Atlantic although it is modified by the different configuration of the continents. The North Equatorial Current is well developed; its middle part is about at 10° north latitude. It is warm, poor in nutrients, and has temperatures as high as 29.5 C. This current turns northward off the Asiatic coast where it is known as the Kuroshio Current, just as the corresponding current of the Atlantic becomes the Florida Current. The Kuroshio is warm and poor in nutrients. The waters of this current turn eastward and flow south of the Aleutian Islands as the North Pacific West Wind Drift. The waters now, however, are cold and rich in nutrients, with surface temperatures around 8° C, and the phosphate content of the upper 50 meters is over 100 mg PO4/m³. These

waters are deflected to the south by the continent of North America, along the west coast of which they flow as the California Current. By the time this water has reached a latitude of 30° north it has attained tropical temperatures (above 20° C) and has become depleted of nutrient salts. It continues into the North Equatorial Current to complete the circuit. The polar front or subpolar convergence of the North Pacific extends northeastward from Japan at a point at about 38° north latitude. At this line the cold arctic waters of the Oyashio meet the warm waters of the Kuroshio. Not only does the North Pacific Intermediate Current originate here. but there is considerable mixing of the two types of water at the surface, so that from here the water of the Kuroshio or the North Pacific West Wind Drift is colder and richer in nutrients because of the admixture of cold and rich water from the north. All the Carnegie stations off Japan were to the south or east of the line of convergence as indicated by Schott (1935), but in the hydrographic studies of the Carnegie (see Sverdrup, 1944) there was found in the upper 500 meters a definite line of demarcation between the cold water to the north and the warm water to the south, principally at the latitude of 38° north, between stations 115 and 116.

A loop of <u>Carnegie</u> stations, with a center about northeast of Hawaii, lies inside the main current system of the North Pacific, and extends into the subtropical convergence. This central part of the North Pacific can be likened to the Sargasso Sea of the Pacific. The water is of high temperature and low nutrient content to comparatively great depths. For instance, the temperature is often above 20° C to more than 100-meters depth with total depletion of phosphate.

South Pacific Ocean. -- In the South Pacific also, the current system is in the form of an extensive vortex; in this case, however, it rotates in a counterclockwise direction since it is in the Southern Hemisphere. In the south of this circuit there is the South West Wind Drift. which travels easterly around the earth in a more or less uninterrupted manner in the subantarctic latitudes. This current is cold and rich in nutrients. It lies a little to the south of the most southerly Carnegie station, station 60, at 40° south. An offshoot of this great oceanic stream, the Humboldt Current, extends northward up the west coast of South America and brings cold, rich water into this area. The waters from this region turn to the left and flow westward as the South Equatorial Current. The main part of this current lies at about 3° north latitude. The water of this current increases in temperature and decreases in nutrient content as it progresses, so that in the western Pacific it is very warm and poor in nutrients, whereas in the eastern part, near its origin, it is not so warm (temperatures of 20° or less around the Galapagos) and is richer in nutrients (25 to 50 mg PO4/m3). It should be noted, however, that the waters of the South Pacific are nowhere depleted of phosphate although the surface temperatures may be several degrees higher than in depleted areas of the North Pacific. The South Equatorial Current gives off numerous, if not continuous, offshoots to the south. One of these offshoots departs at about longitude 120° west, and thus forms a minor vortex with the Humboldt Current which has been called the Easter Island Eddy by some. The water in this eddy showed the lowest phosphate content of any water investigated by the Carnegie in the South Pacific. The currents of the southwestern Pacific will not be discussed as no Carnegie stations

were occupied in that area. The Equatorial Countercurrent is a narrow, shallow stream extending eastward in a direction opposite to its neighbors, at about latitude 6° north. It is warm and poor in nutrients to the west, but has lower temperatures and higher nutrient content to the east, probably because of admixture with water from the southern current system.

There are also <u>Carnegie</u> stations in the Panamic area. The water in this region probably has a multiple origin. It has both a high temperature and a high nutrient content.

#### Temperature

In the North Atlantic south of the subpolar convergence, the surface temperatures are mostly above 20°C (chart 50). There is an increase in temperature southwestward to maxima above 28° in the Caribbean region. In the North Atlantic West Wind Drift the temperatures rapidly decrease to 11° and 12° at Europe. At the other stations, farther north, the surface temperatures are mostly around 10°C.

In the North Pacific there are six stations in water with surface temperatures less than 10° (stations 119 to 124) south of the Aleutian Islands to the Kurils. Toward Japan there is a rapid increase in temperature southward so that there are only three stations in the transition zone between the cold northern water and the warm tropical water of the south. In the eastern Pacific, on the other hand, this transition is very gradual so there are seven widely spaced stations between the 10° water south of the Aleutians and the 20° water of the tropics, stations 125 to 131.

In the tropical regions of the Pacific the surface temperatures are mostly between 22° and 28° with the highest temperatures in the west. Temperatures of less than 20°, however, were recorded at two stations in the region of the Galapagos, stations 42 and 43. The effects of the Humboldt Stream are noted in a general lowering of the temperatures in the southeastern Pacific region, although temperatures as high as 25.27 were recorded off Peru. The Carnegie stations south of 20° south latitude were so far from South America that they do not show the severe effects of this current. Only three of the stations showed temperatures less than 20°. Farther south, however, beyond 30° south, the effects of the South West Wind Drift are very noticeable, with a fairly rapid reduction of the surface temperatures to 14.97 at 40' south at station 60.

#### Salinity

The central North Atlantic in the Sargasso Sea region has the highest surface salinities of any area traversed by the <u>Carnegie</u>, namely over 37 per mille (chart 51). In the North Equatorial Current the salinity is about 36 per mille; at the cold northern stations it is mostly around 35 per mille, although there was one station southeast of Newfoundland where the salinity was as low as 32.66 per mille.

In the central North Pacific the surface salinities are slightly more than 35 per mille. At the subpolar convergence this is reduced to less than 33 per mille and the salinities of the North Pacific West Wind Drift remain under this value to northern California. In the Panamic region the salinity is quite low, namely, 30 per mille. The values increase westward from this area in

the North Equatorial Current with a tongue of 34 per mille water reaching 140° west longitude.

In the South Pacific there is a zone of maximum salinity centered at 20° south latitude and about 125° west longitude with values over 36 per mille. Salinities decrease westward to 35 per mille at Samoa. Southeastward from the zone of maximum the surface salinities decrease to 34 per mille.

#### Phosphate

Since the nutrient salt content of sea water is known to be important in the total production of the phytoplankton, it is necessary to examine the variation in nutrients as a possible important factor in the distribution of individual species. Phosphorus and nitrogen are the most important plant foods in this respect. Only phosphate data are available for a discussion of the oceans as a whole but, since the variations in quantities of phosphate and nitrate run parallel, a description of phosphate distribution will suffice to give a general picture of the distribution of phytoplankton foods in the areas investigated by the Carnegie. The discussion that follows deals with values which are the means of observed values for the surface and for 50 meters, from Carnegie data.

The warm North Atlantic waters are practically devoid of phosphate to 40° north latitude. Two stations just south of this latitude (stations 1 and 2) showed values above 10 mg PO4/m3. North of 40° north latitude the mean values for the upper 50 meters were practically everywhere between 25 and 75 mg PO4/m3.

Most of the great area of the North Pacific between latitudes 10° and 38° north is practically devoid of phosphate, with values less than 10 mg. Along the subpolar convergence northeast of Japan the phosphate content rapidly increases northward to over 100 mg. North Pacific West Wind Drift the values are well above 100 mg to longitude 150° west where they gradually begin to drop off southward. This southward gradient is in the California Current. Close off California the values are between 25 and 75 mg. Farther out there is a rapid decrease to the very low values of the "Sargasso Sea of the Pacific." The North Equatorial Current lies in this area of extremely low phosphate content.

Nowhere to the south of this current in the Pacific is there an area devoid of phosphate. The area of lowest phosphate content in the South Pacific is in the Easter Island Eddy. At only two stations here, however, did the values fall below 10 mg. The subantarctic waters of the South Pacific West Wind Drift are rich in nutrient salts. The effects of this are shown by phosphate values above 50 mg at Carnegie stations 60 and 61 at about 40° south latitude. Values over 100 mg were found along the Peruvian coast, probably the combined effect of the Humboldt Current and local upwelling. In the general region between Peru and the Galapagos and in the Panamic region the values are above 50 mg. In the South Equatorial Current and its offshoots to the south the mean phosphate values for the upper 50 meters are mostly between 25 and 50 mg as far west as Samoa. South and west of here there is a tendency for the values to fall off.

#### HORIZONTAL DISTRIBUTION OF CERATIUM

Ceratium Life Zones in the Areas Traversed by the Carnegie

The area traversed by the Carnegie can be divided into five regions on the basis of the Ceratium floras (chart 54). Two of these regions are in the North Atlantic, three are in the Pacific. They are also character-

ized by particular hydrographic conditions.

Region 1. Cold North Atlantic (stations 3 to 13). --This region includes the loop of eleven stations lying north of 40° north and extending to Iceland. The entire area is composed of eutrophic water with surface temperatures below 16° C and the phosphate content of the upper 50 meters above 20 mg PO4/m3. The Ceratium flora in this region is characterized by subpolar species as well as by tolerant tropical species which probably have been carried northward by the West Wind Drift and its tributaries. It is also characterized by a paucity of species (see p. 6), although the total population is relatively high. The number of species at each station was; ten at two stations, less than this at the rest, and as low as one and two at some. 1 The total number of species found in the region was only fourteen.

The following species were found at five or more of the eleven stations in the region. They are either subpolar or cosmopolitan species.

C. arcticum

v. arcticum at six stations v. longipes at seven stations v. ventricosum at five stations

- C. furca
- fusus
- C. horridum v. horridum
- C. lineatum
- macroceros subsp. macroceros
- C. tripos subsp. atlanticum

The following species were found at only one to three stations in the region. They are all tolerant tropical or cosmopolitan species.

- C. arietinum subsp. bucephalum
- C. azoricum
- C. declinatum
- C. extensum
- C. hexacanthum
- . horridum var. molle
- C. macroceros subsp. gallicum
- massiliense
- C. ranipes

Thus, the dominant flora of region I is subpolar in character and a subdominant element is made up of tolerant tropical species. No strictly tropical forms were found here. The least tolerant forms were C. declinatum, C. macroceros subsp. gallicum, and C. ranipes,

1 In order to make the records comparable, only oceanc graphic stations are considered in the discussion of numbers of species at stations. The records of the interposed surface plankton stations have not been used. and each of these were found at only one station in the southern limit of the region.

Region II. Warm Atlantic (stations 1 to 2, 14 to 34). -- This region includes twenty-three stations, all of which lie south of 40° north latitude. The entire area is composed of water with surface temperatures above 20° C. The phosphate content is extremely low everywhere except at the three northernmost stations where the mean values for the upper 50 meters were from 14 to 52 mg PO4/m<sup>3</sup>. At the rest of the stations the values were 10 mg or less. Consequently, except to the north, the region supports a very small quantity of plankton and is distinctly oligotrophic. The sparse plankton, however, is composed of a large number of species. This number was between ten and twenty per station in the Caribbean Sea and western part of the North Equatorial Current, but higher at the other stations, being between twenty and thirty species per station at all stations but station 16 where there were thirty-three. The total number of species found in this region was forty-six.

The Ceratium flora in region II is distinctly tropical, with the usual number of cosmopolitan forms and a few subpolar occasionals. The following species were found at fifteen or more of the twenty-three stations. This lists represents only intolerant and slightly tolerant forms except for two very tolerant species (C. hexacanthum and C. massiliense) and two cosmopolitan spe-

cies (C. macroceros and C. tripos).

C. breve

C. candelabrum

C. contortum

C. contrarium

C. euarcuatum

C. gibberum

C. gravidum C. hexacanthum

C. macroceros

subsp. macroceros at three stations subsp. gallicum at twenty-one stations

C. massiliense

C. ranipes

v. inclinatum at seventeen stations

v. tenuissimum at seven stations

C. tripos

subsp. atlanticum at eight stations subsp. semipulchellum at nineteen stations

C. vultur

v. sumatranum at fifteen stations

v. pavillardii at eight stations

v. japonicum at eight stations

v. vultur at eleven stations

v. recurvum at ten stations

The following species were found at from five to fourteen stations. They consist of tropical and cosmopolitan species as well as one subpolar.

C. arcticum

v. arcticum at six stations

v. longirostrum at six stations

v. ventricossum at one station

C. arietinum

subsp. arietinum at four stations subsp. gracilentum at two stations

C. carriense

C. declinatum

extensum

C. furca

C. fusus

C. horridum

v. horridum at five stations

v. molle at nine stations

v. claviger at one station

C. limulus

C. lunula

C. paradoxides

C. pulchellum

C. reflexum C. symmetricum

v. symmetricum at one station

v. coarctatum at nine stations

v. orthoceros at four stations

C. teres

C. trichoceros

The following species were found at less than five stations in the region. This list comprises intolerant tropical species almost exclusively.

C. azoricum

C. belone

C. cephalotum C. digitatum

C. concilians C. falcatum

C. humile

inflatum

C. incisum

C. longirostrum

C. lineatum
C. longissimum

C. subrobustum

The relative frequency of the species in this region is approximately the same as that for the collection as a whole so that no particular significance can be attached to it. The species that are rare in region II are rare throughout the world and vice versa.

The southern part of region II corresponds to the northern part of Peters' (1934) region I of the South Atlantic. The composition of dominant forms in the Car-

negie material agrees with that of Peters.

The area with a low number of species per station from stations 26 to 34, including the Caribbean Sea, cannot be considered biologically different except in its greater general poverty. The temperatures are higher there, all above 27° or 28° C, and the plankton generally sparse. Although the number of species per station is generally low throughout this area, the total number for the area is not, on the basis of number of stations involved, much different from the total for region I. The species not represented are mostly the rare forms. Thus it is probably simply a case of a very poor production of all species so that the rarer forms are seldom collected.

Region III. Cold North Pacific (stations 116 to 128). -- This region includes thirteen stations, all but one of which lie north of 40° north latitude. The area is composed of cold eutrophic water with surface temperatures below 17° C (as low as 7.15 at one station), and the phosphate content of the upper 50 meters above 25 mg PO4/m<sup>3</sup> at all stations but one and above 100 mg at the seven northernmost stations. Consequently this region supports a dense growth of plankton although the number of species is small. This number is below ten at all but one station.

The Ceratium flora in this region is characterized in general by a few subpolar and cosmopolitan species and at the southernmost stations there are a few records of slightly tolerant and very tolerant tropical species.

The following species were found at more than three of the stations. They are either subpolar or cosmopolitan species.

C. arcticum

v. arcticum at two stations

v. longipes at nine stations

C. arietinum subsp. arietinum at six stations subsp. bucephalum at two stations

C. fusus

C. pentagonum subsp. pacificum

v. inclinatum

C. tripos subsp. atlanticum at seven stations subsp. semipulchellum at one station

The following species were found at three or less stations in the region. This list is composed of subpolar, cosmopolitan, very tolerant, and slightly tolerant tropical species.

> C. candelabrum C. azoricum C. carriense C. concilians C. contrarium C. extensum C. gravidum C. lineatum C. furca C. horridum v. horridum C. macroceros C. massiliense subsp. gallicum C. petersii C. tenue

Region IV. Warm Pacific (stations 45 to 47, 63 to 66, 78 to 115, and 129 to 160) .-- This region includes eighty-seven stations covering the tropical Pacific and extending to approximately 40° north and 35° south latitudes except in the southeast Pacific where it meets the southeast Pacific region. Region IV is characterized by warm water with surface temperatures above 20° except at the borders of the region where it is lower, particularly off California where stations with surface temperatures as low as 16.3 have been recorded. The phosphate content of the water in this region is not the same throughout. The central part of the North Pacific is practically devoid of phosphate and mean values for the upper 50 meters is under 10 mg PO4/m3. At the northern limits of the region these values increase to 25 mg. The phosphate content of the water in the southern part of region IV is mostly above 25 mg except in the Easter Island Eddy where it is between 10 and 25 mg.

Region IV is characterized by a large number of species of Ceratium per station although the total plankton population is low on the whole. The number of Ceratium species per station is everywhere between twenty and thirty except for four stations near the equator where it is over thirty and at the northern transitions where it is between ten and twenty.

The Ceratium flora of this region is distinctly tropical and includes all the strictly tropical species as well as the tolerant ones and cosmopolitan and stray subpolar

The following species were found at more than sixty stations in this region. This list is composed principally of slightly tolerant and very tolerant tropical species.

C. candelabrum

C. carriense

C. contortum

C. contrarium

C. declinatum

C. euarcuatum

C. extensum

C. gibberum

C. gravidum C. hexacanthum

. macroceros subsp. gallicum

C. massiliense

C. tenue

v. inclinatum at fifty-eight stations v. tenuissimum at twenty-one stations

subsp. atlanticum at twelve stations subsp. semipulchellum at seventy-five stations

The following species were found at twenty-five to sixty stations in the region. This list is composed mostly of intolerant and slightly tolerant tropical species.

> C. arietinum subsp. arietinum at sixteen stations

subsp. bucephalum at fifteen stations

bigelowii C. breve

C. cephalotum C. concilians

C. deflexum

C. falcatum C. furca

C. fusus

C. limulus

C. lunula

C. paradoxides

C. pentagonum subsp. tenerum

C. praelongum C. platycorne

C. pulchellum

C. ranipes

C. subrobustum

C. symmetricum C. teres

C. vultur

v. sumatranum at thirty-four stations

v. regulare at one station

v. reversum at six stations

v. pavillardii at seven stations

v. vultur at sixteen stations

v. japonicum at eighteen stations

The following species were found at less than twentyfive of the stations in the region. This list, also, is composed principally of intolerant and slightly tolerant spe-

C. arcticum v. longipes

C. aultii

C. axiale

C. azoricum

C. belone C. böhmii

C. carnegiei

C. digitatum C. filicorne

C. geniculatum C. horridum

v. horridum at ten stations

v. claviger at ten stations

v. molle at seven stations

C. incisum

C. inflatum

kofoidii

C. longirostrum

C. petersii

reflexum

C. setaceum

Region V. Southeast Pacific (stations 35, 36, 38 to 44, 58 to 62, and 67 to 77) .-- This region includes twentyfive stations in the southeastern Pacific from Panama to 40° south latitude and from the South American coast

westward. It has two tongues extending westward, one to the north, and one to the south of the Easter Island Eddy. Although the temperatures vary a great deal in this area, the water is everywhere eutrophic. The surface temperatures vary from 14.97 C at the southernmost station to 27.4 in the Panama region. The mean phosphate content of the upper 50 meters is everywhere above 25 mg PO<sub>4</sub>/m<sup>3</sup> and is above 50 mg at all stations except those bordering the Easter Island Eddy.

The waters of this region support a large plankton population and, characteristically, few species are present. Region V has been delimited by the points at which the number of species per station rises above twenty. Not only is the number of species lower in this region than in the warmer tropical waters to the west, but the composition of the Ceratium flora is somewhat different. The following tropical species found to the west were absent from region V. They are, significantly, all intolerant tropical species.

> C. cephalotum C. axiale C. digitatum C. inflatum filicorne C. longirostrum

C. reflexum

The following species were found at fifteen or more stations within the region. This list is composed mostly of cosmopolitan and tolerant tropical species.

> C. candelabrum C. contortum

C. furca

C. fusus

C. horridum

- v. horridum at twelve stations
- v. molle at five stations
- v. claviger at four stations

C. lunula

C. massiliense

C. pentagonum

subsp. tenerum

C. tripos

subsp. atlanticum at ten stations subsp. semipulchellum at fifteen stations

The following species were found at five to fourteen stations in the region. They are mostly slightly tolerant tropical species.

C. arietinum

subsp. arietinum at nine stations subsp. gracilentum at three stations subsp. bucephalum at three stations

C. azoricum

C. breve

C. carriense

C. concilians

C. declinatum

deflexum

C. extensum

C. gibberum

C. gravidum

. hexacanthum

C. limulus

C. macroceros subsp. gallicum

C. ranipes

C. symmetricum
C. tenue

- v. inclinatum at four stations
- v. tenuissimum at two stations

C. teres

C. trichoceros

C. vultur

v. vultur at two stations

v. pavillardii at two stations

v. reversum at seven stations v. regulare at one station

The following species were found at less than five stations. They are notably almost all intolerant tropical species.

> C. belone C. böhmii C. carnegiei C. compressum C. euarcuatum C. falcatum C. incisum C. kofoidii C. longissimum C. paradoxides C. petersii C. platycorne C. praelongum C. pulchellum C. setaceum C. subrobustum

It is evident from the above lists that the most frequent forms in region V are either cosmopolitan or tolerant tropical species. The intolerant tropical forms are rarely collected in the region so they compose the bulk of the list of rare forms.

#### Richness of Species in Different Areas

The well-known difference in number of species found in cold and warm areas of the oceans is well illustrated by the Carnegie Ceratium data (see chart 53). In the cold North Atlantic the number of species found at each station was everywhere less than ten. This area resembles the floristic region I, cold Atlantic.

South of this area there is a transition zone in which the number of species per station is between ten and twenty. This lies in region II, the warm Atlantic region. The rest of this region is characterized by high number of species, more than twenty, except in the western part of the North Equatorial Current, from longitude 40° west to Panama, where the values were equal to that of the transition zone, namely, between ten and twenty species per station.

In the Pacific the cold northern water is characterized by less than ten species per station. This area is almost exactly like the floristic region III, cold North Pacific. At the southern limits of this area in both the west and east there is a transition zone with values between ten and twenty species per station.

These transitions lie within region IV, warm Pacific. The rest of this region has more than twenty species per station and, at some stations, more than thirty.

In region V, southeast Pacific, the values are mostly transitional in amount, namely, between ten and twenty species per station. At one station west of the Panama area (station 37) there were more than twenty species. It is possible that this station has not been rightfully included in region V but belongs to region IV, the warm Pacific. The surface temperature at this station was higher than at any other station in region V, namely, 27.º12 C. The area at this latitude between this station and the central Pacific is unknown oceanographically and planktologically so that it is not possible to say whether station 37 lies in an eastern extension of region IV or

South of this station there were two stations at which the number of species per station was less than ten, stations 38 and 39. These were the only stations in latitudes lower than 40° where the number of species per station dropped below ten.

The relation between the richness of species and

environmental conditions will be taken up in the following sections.

#### FACTORS AFFECTING THE HORIZONTAL DISTRIBUTION OF CERATIUM

#### Salinity

It is probable that the slight variations in salinity found in the oceanic waters have no influence on the distribution of Ceratium species. Peters (1934) could demonstrate no effect in the South Atlantic nor could Nielsen (1934) in the South Pacific. Nielsen did find that in the Panama region, where the salinity is low, the total number of species was low. Conditions were neritic there, however, so it was impossible to determine which was the influencing factor. In the Carnegie investigations no correlation could be found between salinity and the distribution of any species. In this connection it is worthy of note that the boundary between the distribution of the warm and cold water species of the North Atlantic is approximately at the 36 per mille isohaline; in the North Pacific the limits of the same species occur at 34 per mille off Japan and 33 per mille off California. Thus, apparently these species are not affected by such slight variations in the salt content as are found in the open ocean.

#### Nutrient Salts

Since the depletion of phosphate and nitrate is known to limit the total production of phytoplankton in some localities, it is important to examine these factors in relation to the world distribution of Ceratium species. Nitrate determinations were not made on the <u>Carnegie</u> but, since the fluctuations in nitrate and phosphate run in a parallel manner, it is sufficient to discuss the phosphate distribution as representative of the inorganic nutrient materials.

In general, regions of very low phosphate content are characterized by sparse populations of all species but by a larger number of species. This led Peters (1934) to suggest that nitrate and phosphate inhibited the growth of certain species. Thus in region I of the North Atlantic where the phosphate content of the upper 50 meters is above 25 mg PO4/m3, the number of Ceratium species is less than ten per station (see charts 52 and 53). In region II the phosphate content is under 10 mg and the number of species of Ceratium per station everywhere above ten and, usually above twenty, and at one station above thirty. Likewise in the Pacific the phosphate-rich regions are characterized by a poor Ceratium flora. Region III, where the concentrations run above 25 mg and at most stations above 100 mg, the number of species per station is less than ten. The correlation is not quite so good in region IV, the warm Pacific region. The number of species per station is between twenty and thirty throughout most of this region although the phosphate content of the northern part is under 10 mg and in the southern part it varies from 10 to 50 mg. The southeast Pacific region has many values above 50 mg, that is, higher than the warmer region to the west. Accordingly the number of species per station is less, namely, between eleven and twenty.

Thus, within any given area there seems to be a correlation between high phosphate content and small number of species. It is important to note, however, that the limit between any particular number of species does not occur at the same concentrations of phosphate. Thus, in the northern Atlantic less than ten species are found in water with 25 to 50 mg of phosphate, whereas in the South Pacific the area with more than twenty species includes water with over 25 mg PO4/m³. Similarly, in the North Pacific all the water containing more than 50 mg PO4/m³ has less than ten species per station, whereas in the southeastern Pacific there are areas where the phosphate content is above 50 and the species per station are between ten and twenty.

The same sort of correlations can be found between the Ceratium life zones and phosphate content. Each region has its characteristic phosphate content. Thus regions I, III, and V have high concentrations, whereas region II has uniformly low concentrations, and region IV is low in the north and has medium values in the south. As in the case of number of species, the correlation with floras is not exact. Thus the flora of region I has little in common with the flora of the southern part of region IV which has the same phosphate content.

These studies tend to indicate that the phosphate content of the water has no direct effect on the horizontal distribution of Ceratium species, at least not as regards absolute values. There are indications, however, that the relative values in a given region bear some relation to the Ceratium flora. Perhaps some factor associated with an <u>increase</u> in phosphate is significant in the distribution of Ceratium species.

#### Temperature

Peters (1934) came to the conclusion that water temperatures between 15° and 27.5 C had no influence on the distribution of Ceratia in the South Atlantic. However, he was considering the yearly range of temperature at each locality. Peters was able, on the other hand, to group his species according to thermal environments. Of his fifty-five species, thirty-three were limited to warm water, twenty-one to warm and cool water, and only one was observed in the southern cold water. Nielsen (1934) was inclined to consider 15° C too low for noneffective temperatures. In the regions which he investigated in the South Pacific, however, he did not find. many cases of temperature correlation. He designated only two temperate forms -- C. petersii and C. tripos atlanticum. He also found that C. filicorne is restricted to high temperatures in the South Equatorial Current. Nielsen, however, did classify his species according to temperature zones with the following categories: tropical, tropical-subtropical, tropical-subtropical-temperate, and temperate.

In the <u>Carnegie</u> collections it is possible to study the transition from tropical to cold water regions in four different places: in the western North Atlantic, western

North Pacific, eastern North Pacific, and eastern South Pacific. A comparison of the Ceratia distributions in these regions is very interesting, and gives us a clue to the factors controlling distribution, at least in the case of some species. For these studies it is important to consider first the most common tropical species so that negative records in the transition zones can be given some weight. Ceratium contortum is a good example of a tropical distribution (chart 32). The species drops out at surface temperatures of about 20° in the North Atlantic, at above 20° off Japan, 15° off California, and 15° in the southeastern Pacific. Many other species have a similar distribution, some more closely confined to certain temperatures and some less. Ceratium massiliense (chart 38) is a common tropical form whose limits of distribution parallel rather closely the 15° C isotherms in the four transitions. Some species show a definite restriction to tropical water except for a particular displacement by a current. A good example of this is Ceratium hexacanthum which is within the 20° isotherm at the three transitions in the Pacific, but in the Atlantic it is apparently carried by the currents to Iceland where the surface temperature is less than 10°. Conversely, there are species which are restricted to warm water throughout their ranges. Examples of these are C. breve (chart 21) and C. lunula (chart 31).

A few forms are found in the cold water but not in the tropics, or only in insignificant numbers there.

Ceratium arcticum (chart 47) is an example. Still a third general type of distribution is found in such forms as C. fusus (chart 17) which occur in cold water as well as in warm, and are truly cosmopolitan.

On the basis of the distributions of the Ceratium species at the Carnegie stations, a classification consisting of three main categories was devised: tropical, subpolar, and cosmopolitan. The tropical, in turn, was divided into three regions. Those species which were rather closely restricted to surface temperatures of 19° or above were grouped together as intolerant tropical species. Those which transgressed a little into the transition zones were called slightly tolerant tropical forms and, finally, those which were carried far beyond the tropical regions were designated very tolerant tropical forms. This classification has no category for temperate species such as most previous classifications had. The authors believe that there are no truly temperate oceanic species of Ceratium. The temperate latitudes are populated by tropical and cosmopolitan forms with occasional appearances of subpolar forms. Following is the geographic classification of the Carnegie Ceratia based on the above scheme.

#### Intolerant Tropical

| C. incisum     | C. longirostrum |
|----------------|-----------------|
| C. inflatum    | C. falcatum     |
| C. praelongum  | C. cephalotum   |
| C. digitatum   | C. belone       |
| C. bigelowii   | C. breve        |
| C. euarcuatum  | C. limulus      |
| C. paradoxides | C. vultur       |
| C. longissimum | C. reflexum     |
| C. deflexum    | C. lunula       |
| C. filicorne   | C. trichoceros  |
| C. axiale      | C. geniculatum  |
| C. humile      |                 |

#### Slightly Tolerant Tropical

| C. subrobustum       | C. teres             |
|----------------------|----------------------|
| C. kofoidii          | C. gravidum          |
| C. pulchellum        | C. symmetricum       |
| C. declinatum        | C. gibberum          |
| C. concilians        | C. ranipes.          |
| C. carriense         | C. platycorne        |
| C. tenue             | C. contrarium        |
| C. macroceros subsp. | C. pentagonum subsp. |
| gallicum             | tenerum              |
| C. candelabrum       | C. contortum         |
| C. tripos subsp.     | C. aultii            |
| semipulchellum       | C. setaceum          |
| C. carnegiei         | C. böhmii            |
|                      |                      |

#### Very Tolerant Tropical

| C. azoricum    | C. massiliense |
|----------------|----------------|
| C. arietinum   | C. extensum    |
| C. hexacanthum |                |

#### Cosmopolitan

| C. h  | orrid | um     | C.         | fusus    |     |
|-------|-------|--------|------------|----------|-----|
| C. ft | ırca  |        | C.         | petersii | (?) |
| C. tı | ipos  | subsp. | atlanticum | -        |     |

#### Subpolar

| C. lineatum          | C. macroceros subsp |
|----------------------|---------------------|
| C. pentagonum subsp. | macroceros          |
| pacificum            | C. articum          |
| C. compressum (?)    |                     |

#### Currents

Currents are certainly important in the distribution of Ceratia. They cause displacements in the normal distribution by carrying populations into regions where they have not developed, and they create displacements of the normal range of environmental conditions so that species can develop in regions which otherwise would not be favorable for them. The current factor in distribution, however, is the most difficult one to demonstrate by a gross world survey such as that of the <u>Carnegie</u>. The value of Ceratia as current indicators is undoubtedly much greater than the <u>Carnegie</u> data would indicate. The importance of such indicators is evidenced most in temporary current anomalies which can be observed satisfactorily only by a continued study of a particular area.

It should be emphasized that a current which displaces a flora from its normal distribution also displaces the environmental conditions. When the displaced water mixes with the adjacent water, it may no longer be suitable for the organisms displaced and they disappear. That the amount of mixing in such currents is great is indicated by the rather sharp delimitation of many of the Ceratium species in the Carnegie collection. This is particularly striking in the Kuroshio and Gulf Stream, two currents well known for their velocity and general influence. In these currents the tropical floras change their facies rather rapidly when the surface temperatures drop below 19° C.

Peters (1934) considered that ocean currents played a great role in the distribution of Ceratia in the South Atlantic. He was able to give comparatively few instances of displacements of species, however, in the

areas he studied.

The authors tend to agree with Gran (1912) that the nature of a Ceratium flora is determined more by the chemical-physical conditions of the water than by transportation by currents. The fact that a warm current carries a tropical flora into high latitudes is not opposed to this argument, as present evidence indicates that such a current will do this principally by carrying the tropical environment with it.

In the <u>Carnegie</u> investigations there were four regions where current influences would be expected to be demonstrated. These concerned four great currents: the Gulf Stream, Kuroshio, California, and Humboldt currents.

In the North Atlantic West Wind Drift or "Gulf Stream" the intolerant tropical species dropped out at about 45° north. The best examples of displacement. however, were found here in the case of some of the tolerant tropical species. Thus, C. extensum was carried to the British Isles to temperatures of 12.°44 C (chart 16) and C. hexacanthum to Iceland in temperatures of 8.92 C (chart 48). Unquestionably these are examples of current displacements as C. extensum was not found elsewhere in temperatures below 14.97 nor C. hexacanthum below 18.97. The occurrence of C. massiliense and C. platycorne off Ireland should probably also be considered displacements (charts 38 and 35). Other tropical species such as C. declinatum and C. ranipes were carried over into region I only as far as station 3, where the surface temperature was 15.5 C (charts 28 and 36).

In the corresponding current of the Pacific, the Kuroshio, we find that the transition from tropical to subpolar floras is more abrupt. Most of the tropical species were not carried into water with temperatures under 20° C. Only C. gravidum, C. candelabrum, and C. tripos semipulchellum, of the tropical species, were carried into water with surface temperatures as low as 15.93 C (charts 3, 5, and 19). No evidence of any tropical species being carried into lower temperatures than that in this region was found.

Corroboration of the lack of displacement in the Kuroshio was found in the distribution of the tropical species at similar latitudes in the western Pacific off California. If the currents were effective in displacing the distributions significantly into different environments, then the tropical species should be found in colder water off Japan than off California. The Kuroshio should sweep populations into cold water and the California Current should push the northern limit southward. This was seldom found, however. The species which disappeared at 19° C off Japan, reappeared at 19° C off California. There were many variations between species but, in the main, the tropical flora of the North Pacific had its northern limits in the western and eastern Pacific at the same isotherm, and this isotherm was at approximately the same latitude, namely 40° north.

There were two striking exceptions to this general distribution, however; the distributions of <u>C. breve</u> and <u>C. lunula</u> (charts 21 and 31). These species were found rather consistently within tropical latitudes, that is, within  $20^{\circ}$  of either side of the equator. The ranges of these species beyond these latitudes, however, does not follow that of other common tropical species which are usually found throughout the warm-water regions to about  $40^{\circ}$  north and south. In the case of <u>C. breve</u> the

records do not extend far north or east of Hawaii. although in the western Pacific they extend to Japan. They are absent from a large part of the southeast Pacific region, although they extend to Easter Island. The distribution of C. lunula is still more uneven in the North Pacific. In the east it was found nowhere north of 20°, whereas in the west it was found continuously to northern Japan, latitude 38° north. In the South Pacific, however, it was everywhere within 20° south latitude. Is it possible that these distributions are determined by the current systems? Certainly such distributions cannot be accounted for by simple current displacements as a bodily displacement of the plankton would have displaced other species as well. Could these curious distributions be the result of a specific susceptibility to something? Is the absence of these species in the southeast Pacific owing to some deleterious effect of the outwash of subantarctic and upwelled water from the south and east, and is their absence from the region between California and Hawaii owing to the combined effects of the California Current and upwelling? The answers to these questions cannot be given until further work is done. It is remarkable that only two species show such distributions. The proof of the validity of these must await further investigations.

The equatorial currents apparently have little effect on the distribution of Ceratia. This is probably because they involve the movements of waters of very similar nature. Although the temperatures of these waters may vary from 20° to 29° C, the surface temperatures above 20° C apparently have no effect on the Ceratia. Nielsen found that C. filicorne was found only in the warmest parts of the South Equatorial Current, but this was not corroborated by Carnegie data (see p. 28). No segregation of Ceratium species within the equatorial regions could be made on the basis of temperature.

The last great current system to be considered is the Humboldt Current off South America. Unfortunately the <u>Carnegie</u> stations did not run near the continent except at Callao so the most highly developed part of the current system was missed. The hydrography of this region is complicated by a strong upwelling along the coast. The changes in the environmental conditions brought about by this upwelling are probably the same as those effected by the Humboldt Current, which brings water from the subantarctic. These changes consist in lowered temperatures and pH, increase in phosphate, etc., and a resultant increase in plankton production. Thus it is impossible to decide whether the biological conditions peculiar to this region should be attributed to current phenomena or to the other hydrographic feature, namely, upwelling.

Probably there is a displacement by the Humboldt Current of antarctic forms northward along the southern part of the South American coast southeast of the Carnegie track, but no evidence of this was observed at any Carnegie station. Probably the only antarctic form of Ceratium is C. pentagonum robustum (Peters, 1934). This did not occur in the Carnegie collection.

The Humboldt Current is deflected westward, and there is a more or less general movement of water away from the South American coast in the southeastern Pacific. How far westward the influences of this movement are felt is an interesting problem. In the discussion of the hydrographic conditions, it was pointed out that the

influence on the chemical and physical conditions of the water are far-reaching. Associated with this we find that the biological conditions have been affected for hundreds of miles offshore. In the first place there is a high production of total plankton; secondly, there is a reduced number of species per station in the region (see chart 53); and thirdly, the development of some of the tropical species apparently has been suppressed.

Many of the tropical species common in the waters to the west were absent in at least certain parts of the southeastern Pacific. Sometimes this distributional hiatus was confined to the Peruvian coast and Galapagos area as in <u>C. extensum</u> (chart 16) and <u>C. tenue</u> (chart 45). Other species seemed to show a more or less general avoidance of the area, as for instance, <u>C. pulchellum</u> (chart 20), <u>C. carriense</u> (chart 40), <u>C. vultur</u> (chart 43), and <u>C. teres</u> (chart 11).

Here again we probably are not confronted with a problem of simple current displacement, but rather with current effects brought about through a modification of the environment. What these peculiar modifications might be will be discussed in the next section.

#### Other Factors

Although the above geographic classification of the Ceratia (p. 8) has a temperature connotation, it is not intended to mean that the controlling factor in Ceratium distribution is necessarily temperature. There are still other factors which are associated with temperature which we have not yet discussed.

Nielsen (1934) is of the opinion that the concentration of plankton organic metabolic products is the most important factor in the distribution of Ceratium species in the warmer seas. Since no measurement of such substances are available, it is impossible to test this theory. Nielsen based his opinion principally on the distribution of neritic and oceanic species and on the relative number of species in these two environments. He emphasized the fact that in neritic waters only a small number of Ceratia occur. That this is not owing to higher concentrations of nutrients alone was shown by the Great Barrier Reef region where the nutrients are low as well as the Ceratium flora. Nielsen found higher concentrations of nutrients in the open ocean (eastern South Equatorial Current) and a diminution in species. He contended that the metabolic products require considerable time for decomposition, that the fertility of

neritic water is replenished from shallow depths where these products have accumulated, and that in oceanic regions no such accumulation can occur. What these metabolic products are, remains to be demonstrated.

Even if the presence of such products is demonstrated and correlations found, their causative nature must be proved and this probably will have to be done

experimentally.

The difficulties in establishing the important environmental conditions are accentuated by the fact that many water conditions change together. The agency which enriches the photic zone to any great degree is a movement of water from deeper levels to the surface layers. This one agency, whether near shore or in the open ocean, brings about a whole set of new environmental conditions. Not only is the phosphate and nitrate content of the water increased, but the temperature is lowered and the hydrogen-ion concentration is increased. Undoubtedly other changes are effected also. If some particular metabolic product is rather stable, as Nielsen postulated, no doubt higher concentrations of this accompany any enrichment of the photic zone. A point worth considering in this connection, however, is that Nielsen's postulated metabolic product poisoning may be purely of plant origin. In this connection Hardy's (1935) discussion of the "exclusion effect" of phytoplankton for zooplankton is interesting. Considerable evidence is being accumulated that indicates that phytoplankton exerts an exclusion effect on many animals. Is it possible that, in a similar way, it may exclude certain oceanic species of Ceratium?

The association of all these factors makes it difficult to select the particular one which might be influencing the distribution of any particular species. Thus the floristic zones outlined above are separated not only by certain temperature differences, but also by certain associated differences in phosphate, pH, plankton content, etc.

The difficulty involved in determining causative factors is well illustrated by the waters of the southeast Pacific where, obviously, some condition associated with the Humboldt Current and upwelling limits the distribution of certain Ceratium species. This condition here is probably not temperature, as many of the temperature records were over 20°. Which of the conditions associated with cold currents and upwelling is the determining one, however, cannot be pointed out at this time.

#### COMPARISON OF THE ATLANTIC AND PACIFIC WATERS

#### ON THE BASIS OF THEIR CERATIUM FLORAS

There is no known difference in the environmental conditions of the waters of the Atlantic and Pacific oceans which might operate to favor or hinder certain species in one ocean and not in the other. Thus it would be expected that, given the same plankton communities, the same species would survive in each. The two oceans are completely isolated from each other, however, except in the south, where they both merge into the Antarctic Ocean, and in the far north, where they are connected by way of the Arctic Ocean and the narrow Bering Strait. Since temperature or some correlated factor is probably

responsible for the distribution of Ceratium species, temperature will be discussed in connection with the comparison of the floras of the two oceans. The surface temperatures in the latitude of Cape Horn in summer are under 8° C. Whether 8° is sufficiently low to constitute a barrier to tropical Ceratium species or their spores, is unknown. The continental barrier between the Atlantic and Indian oceans certainly must be less effective since the temperatures at the Cape of Good Hope in summer may be above 20° C. There is no continental barrier between the Indian and Pacific oceans.

It would be supposed that any species originating in the Atlantic would, in time, be swept to the Indian and Pacific oceans since the currents in the far southern waters are predominantly from west to east. Whether the Pacific tropical species could find their way to the Atlantic by the southern connection is less certain.

The water connection of the two oceans to the north by way of Bering Strait and the Arctic Ocean certainly would be expected to constitute a barrier to Ceratium species, at least to the tropical forms. Bering Strait is shallow and narrow, with water temperatures around 8° C. It is not likely, however, than an organism could pass from here to the Atlantic without passing through water of 0° C or lower.

In the light of this knowledge it is interesting to compare the Ceratium floras of the Pacific and Atlantic oceans. An examination of the <u>Carnegie</u> lists of species for the two oceans shows that most of the species are common to both oceans. Nevertheless, there are some significant differences. Nine of the species occurred in only one ocean and this, significantly was the Pacific. One of these, <u>C. axiale</u>, has been found in the Atlantic by others, so it will be disregarded. The others are as follows: <u>C. aultii</u>, <u>C. bigelowii</u>, <u>C. carnegiei</u>, <u>C. deflexum</u>, <u>C. filicorne</u>, <u>C. geniculatum</u>, <u>C. petersii</u>, <u>C. böhmii</u>.

None of the Atlantic species were absent from the Pacific. In Nielsen's comparison of the two oceans, he cites two examples of Atlantic forms which are absent from the Pacific, namely, <u>C. longinum</u> Karsten (=<u>C. arcuatum longinum</u> in Peters, 1934), and <u>C. minutum Jörgensen</u>. These forms, however, have now been found abundantly in the Pacific in the <u>Carnegie</u> collections (see pp. 35 and 22). Otherwise Nielsen's comparison of the two oceans agrees well with our own, except that he lists <u>C. humile</u> as absent from the Atlantic. It was found in that ocean in the <u>Carnegie</u> collection.

It is true, of course, that the species peculiar to the Pacific are rare forms and may yet be discovered in the Atlantic. In the case of at least three of the species, (C. bigelowii, C. deflexum, and C. filicorne), however, this is not likely, as many records of their occurrence are now being accumulated. For instance, in the Carnegie collection alone there are thirty-seven sample records for C. bigelowii, one hundred five for C. deflexum, and twenty-seven for C. filicorne.

It should be noted that the eight species peculiar to the Pacific are strictly, or only slightly tolerant, tropical species, not occurring at stations where the surface temperature was less than 20° C. Thus, these species might well find it impossible to pass around Cape Horn in the cold southern water.

Therefore, it seems quite possible that the abovementioned seven species have originated in the Pacific Ocean and must forever remain in the warm regions of that great ocean, being barred from the Atlantic by the great southern extension of South America, whereas the forms that have originated in the Atlantic have found an easy migration to the Pacific by way of the Indian Ocean.

We must also bear in mind that the other species of the two oceans may not be as similar as present workers believe. After all, the morphology of Ceratium is known only grossly; very few species have been analyzed in detail, and none of them completely. Perhaps real specific characters have been overlooked. In this connection it is important to examine some differences in the distribution of some of the species which, according to present taxonomic methods, are specifically identical

in the two oceans. Five of the tropical species were decidedly more tolerant to cold water in the Atlantic than in the Pacific; namely, C. furça, C. extensum, C. horridum, C. hexacanthum, and C. tripos atlanticum, whereas one cold water species, C. arcticum was apparently more tolerant to warm water in the Atlantic than in the Pacific (see charts 6, 16, 44, 48, 18, and 47). Ceratium horridum, in addition, seemed to show a difference in its relation to oligotrophic water in the two oceans, being found practically only in eutrophic water in the Pacific but in oligotrophic as well as eutrophic water in the Atlantic. These differences in distribution in the two oceans strongly suggest that the genetic complex of the forms in the two oceans is not identical. The representatives of the two oceans may be different species or subspecies or may be "physiological subspecies." The solutions to these problems must await a more minute morphological examination of the forms in question.

About 20 per cent of the tropical species of Ceratium in the <u>Carnegie</u> collection show either morphological or distributional features peculiar to one ocean, indicating an isolation of the tropical waters of the Atlantic and Pacific. The evidence for the isolation of the North Pacific cold-water region, however, is even more convincing.

Although there are certain similarities between the Ceratium floras of the cold North Pacific and cold North Atlantic regions, there are, on the other hand, some very striking differences which can be accounted for only on the assumption that these two oceans are biologically isolated from each other. The similarities in the two floras are expressed by the occurrence in both regions of the two subpolar species <u>C. lineatum</u> and <u>C. arcticum</u>.

The differences in the floras of the two regions are more striking than the similarities. In contrast with the tropical floras these differences are not one-sided, that is, the "mono-oceanic" forms are not all in one ocean so that, in contrast with the southern oceans, a mutual isolation is indicated.

The significant forms in this case are not species, but subspecies. The first of these to consider is <u>C. furca</u>. This species, as broadly considered, is cosmopolitan. It was noticed, however, that in the Atlantic there was a hiatus between the tropical records and the cold-water records (chart 6). Although no morphological difference could be discerned between the southern and northern forms, it was suggested that they represented at least physiological subspecies (see p. 18). When we turn to the Pacific we find that the species is represented only in the warm-water regions except for one station in region III off Japan, which must be considered a displacement by the Kuroshio. The species is absent along all the rest of the cold-water area traversed by the <u>Carnegie</u>.

The case of another species, <u>C. macroceros</u>, is somewhat more convincing, inasmuch as the subspecies are morphologically easily distinguishable. Subspecies gallicum is characteristic of all warm-water regions. It is widespread over both the Atlantic and Pacific. The species is represented in the cold North Atlantic by subsp. <u>macroceros</u>. In the cold North Pacific, however, the species is conspicuously absent (see chart 37). An assumption of the isolation of the North Pacific based on the above two examples alone would not be very conclusive since it would be based on negative evidence in a region not well investigated, namely, the North Pacific. The following example, however, does not carry this weakness and, taken with the above two, forms a convincing proof of the isolation of that ocean.

This example concerns <u>C. pentagonum</u>, a widespread tropical species. Peters (1934) found a cold-water subspecies in the subantarctic waters of the South Atlantic, subsp. <u>robustum</u>, the most southern representative of the genus. He emphasized the remarkable absence of any representative of the species in the cold northern waters of the North Atlantic. The absence of the species in these waters is well established as the region has been thoroughly investigated. The <u>Carnegie</u> investigations in the North Pacific, however, revealed a very divergent subspecies, subsp. <u>pacificum</u>, which was found only in the cold North Pacific region (see p. 20). It attained a high degree of morphological distinctness in the coldest water, although it intergraded with var. <u>tenerum</u> at its southern limits. There can be no doubt that subsp.

pacificum is not found in the Atlantic and, therefore, is peculiar to the cold waters of the North Pacific.

These three striking differences in the Ceratium floras of the cold regions of the two oceans indicate that a barrier to at least some of the subpolar species exists between these two water masses. The nature of this barrier, of course, is only a matter for speculation. The hydrography of Bering Strait is very poorly known. Any continuous current in either direction, however, would not permit the development of the floras now obtaining in the two oceans, providing the species could traverse the Arctic Sea. Whether they can cross this ocean is also unknown. An investigation of the phytoplankton of the Arctic should throw some light on this problem.

#### THE VERTICAL DISTRIBUTION OF CERATIUM

Karsten (1907) first described a special "shade flora" of the ocean. According to him this consists principally of Coscinodiscus, Planctoniella, and Gossleriella. He thought, however, that the genus Ceratium was represented at different levels by different species or varieties and designated <u>C. gravidum</u> Gourret; <u>C. tripos azoricum</u> Cl. var. breve Ostf., and <u>C. tripos gibberum</u> Gourret as shade species. As Nielsen (1934) states, an inspection of Karsten's lists does not corroborate this idea except in the case of <u>C. gravidum</u>.

Schröder (1911) listed <u>C. inflexum</u> f. <u>claviceps</u> (= <u>C. contrarium</u> f. <u>claviceps</u>), <u>C. platycorne</u>, and <u>C. limulus</u> as species which "avoid" the intense continued sunlight of the "southern waters."

Jörgensen (1920) made an intensive study of the vertical distribution of Ceratium in the Mediterranean. He found that a great number of species which occurred at the surface in the winter, inhabited the deeper levels in the summer. He concluded that the surface summer flora is more or less indigenous to the Mediterranean, whereas the winter species are dependent on a migration from the Atlantic.

Faulsen (1930) and Nielsen (1934) challenged this migration theory of Jörgensen, but Böhm (1931) accepted it. Peters (1934) could not establish any vertical distribution from the material of the "Meteor" expedition.

The <u>Dana</u> collected with closing nets at the following steps: 200 to 100, 100 to 50, and 50 to 0 meters. From such material it was possible to test the idea of the "layering" of the species of Ceratium. Nielsen (1934), who studied this collection, found that about one-third of the Ceratium species occurring in the southern Pacific Ocean must be designated "shade forms," whereas the rest of the species inhabit predominantly the upper layers. He found that the density of the plankton affects the vertical distribution of the shade forms. They occur in higher levels in the richer water, presumably because in such regions there is not sufficient light for growth at the lower levels.

Nielsen (1934) compared the shade forms of Ceratium with the shade plants of the tropical rain forest, all of which have their leaf surface increased in some way. The leaves are thin and there is an increase in assimilating cells. So in Ceratium the cells are thin and crowded with chromatophores. The cell body (and apical horn) may be expanded and crowded with chromatophores

(chloraplasts) as in <u>C. gravidum</u>, or the antapicals may be expanded and rich in chloroplast as in <u>C. platycorne</u>, <u>C. claviger</u>, <u>C. ranipes</u>.

Long-horned forms are found among shade forms as well as among surface forms, but the shade forms always have the horns crowded with chromatophores.

Of the surface forms there is not a single example of surface expansion. Thus, the usual assumption, that surface expansion in Ceratium is a flotation adaptation, is erroneous.

Since the <u>Carnegie</u> plankton collection contains samples collected at 50- and 100-meter depths as well as at the surface, and, since the collection contains practically all the marine species of the genus, it was possible to test the theory of Nielsen in the case of each species. Although the <u>Carnegie</u> collecting nets were open nets, the duration of towing at the particular level was so much greater than the time of hauling in, that the percentage of "contaminants" would necessarily be small. These contaminants, moreover, would be upper-level forms so that they would not introduce any error into the calculations in the case of deep-water forms.

For each species reported in the <u>Carnegie</u> collection, the number of records for each collecting level was computed. Since there were more surface hauls than deeper hauls, these numbers needed to be weighted. Consequently they were computed as percentages of the total number of samples collected at the particular depth. Tables were compiled showing these values, as well as the actual number of records, for the three levels. Since an expression of the relative abundance of the species at each level is more significant than the mere positive record, the number of records of "rare," "occasional," etc., and their percentages were computed as well as the total number, and these were included in the tables.

Such an analysis of the <u>Carnegie</u> distributional records showed that twenty of the species were definitely more abundant in the deeper levels and nine were questionably so. All the twenty species showed an increase in frequency from surface to 100 meters. The agreement between these species and the species indicated as "shade species" by Nielsen is great.

There are only three cases of definite disagreement. Nielsen classified <u>C. subrobustum</u> and <u>C. trichoceros</u> as surface species, whereas the <u>Carnegie</u> data definitely

indicate that they are shade species. On the other hand, Nielsen indicated <u>C. hexacanthum</u> as a shade species, whereas the <u>Carnegie</u> data failed to substantiate this. The agreement between the <u>Carnegie</u> and <u>Dana</u> shade species and the "winter species" of Jörgensen (1920) is also great. Only one of Jörgensen's winter species, <u>C. kofoidii</u>, has not been classified as a shade species by either Nielsen or the present authors. A comparison of Jörgensen's "winter species" with the shade species of Nielsen and the shade species of the <u>Carnegie</u> is given in table 1.

Nielsen (1934) stated that Jörgensen's (1920) observations indicated that Ceratia are phototropic; the shade species in the winter when the light intensity is low come to the surface and thus are able to maintain a position in optimal light conditions.

The authors agree that Jörgensen's observations indicated a phototropic response on the part of the "winter Ceratia," but do not believe that the vertical migration of Ceratia is a simple light reaction phenomenon. In the Carnegie collection the shade species were found most abundantly at 100 meters. Surely the light intensity at this depth even in summer could not be compared with the light intensity at the surface in winter in the Mediterranean or anywhere else in the world for that matter. It is scarcely logical to assume on the basis of the present data that the shade species of Ceratia seek a zone of a particular light intensity.

Is it not possible that we have to deal here not only with a phototropism but a trophotropism as well? In the summer time the upper levels of the sea are depleted of nutrient salts to a depth equal at least to that populated by the phytoplankton. Obviously, the species of phytoplankton which are the most tolerant of shade would have a decided advantage in the quest for nitrogen and phosphorus, which occur in the deeper levels in large quantities. Is it not possible that these forms have a positive tropic reaction to nutrient salts or some associated condition as well as a phototropic response? By such a mechanism each species would maintain a position optimal for photosynthesis.

There is another, and simpler, explanation that may account for the vertical migration of Ceratia. There may be a simple reversal of phototropic response, depending on the physiological condition of the organism; in this case on the assimilation of inorganic nutrients or some associated substance. The mechanism would be such that with the assimilation of these substances the organism is positively phototropic, thus remaining near the surface in the winter; but with the diminution of this assimilation the organism becomes negatively phototropic, and thus descends to lower levels of greater nutrient content.

It must always be borne in mind that the poverty of nitrogen and phosphorus which land plants everywhere are fighting, is accentuated to a high degree in the ocean. When a land plant dies, its nitrogen and phosphorus are soon returned to the soil to be utilized by other plants. On the other hand, when a planktonic plant dies, it sinks below the growth zone and its nutrient elements are lost, to be returned only after a long period of time except in high latitudes and in certain peculiar regions. This is particularly true of the tropics, where the thermal stratification is extreme and continuous. In these regions it is probable that the fertilization of the photic zone is accomplished alone by the nocturnal visits of a sparse

zooplankton. It is in such regions as this that the shade species of Ceratium develop. Nielsen (1934) has already observed that the shade species are all warm oceanic; they do not occur in neritic conditions nor in the coldwater southeast of New Zealand. The Carnegie observations show that none of the shade species are coldwater species, with the possible exceptions of C. arcticum and C. horridum. Of the twenty-nine species definitely or questionably shade species according to Carnegie data, seventeen are intolerant tropical species, eight are slightly tolerant tropical species, only two are very tolerant tropical species, one is cosmopolitan (C. horridum), and one subpolar (C. arcticum).

The data concerning the depth at which C. arcticum lives most abundantly are not conclusive, but they suggest that it is a shade species. Ceratium arcticum, a cold-water species, may be a shade species of another type entirely. Shiviroff and Federoff (1938) have found phytoplankton flourishing under the arctic ice cap. They have not yet reported the species found, but probably C. arcticum is one of them as it is characteristic of arctic currents. In the low illumination occurring under the ice it would be expected that only species with a high tolerance for shade would be found. The nutrients here are rich. These forms, when living in exposed ice-free regions, would then have the advantage of the ability to live at greater depths than the species not tolerant of shade, so they would be found at depths equal to that of the tropical shade forms.

Table 1. Shade species of Ceratium

| Species        | In summer,<br>Mediter-<br>ranean | Dana<br>collection | Carnegie<br>collection |
|----------------|----------------------------------|--------------------|------------------------|
| C. praelongum  |                                  | yes                | yes                    |
| C. cephalotum  | ****                             | yes                | yes                    |
| C. gravidum    | yes                              | yes                | yes                    |
| C. digitatum   | yes                              | ?                  | yes                    |
| C. belone      | yes                              | no                 | ?                      |
| C. incisum     | yes                              | no                 | ?                      |
| C. subrobustum | ,                                | no                 | yes                    |
| C. kofoidii    | yes                              | no                 | no                     |
| C. setaceum    | yes                              | ?                  | ?                      |
| C. geniculatum | ?                                |                    | ?                      |
| C. bigelowii   | ****                             | ?                  | ?                      |
| C. euarcuatum  | yes                              | yes                | yes                    |
| C. filicorne   |                                  | yes                | yes                    |
| C. symmetricum | yes                              | yes                | yes                    |
| C. axiale      |                                  | yes                | ves                    |
| C. aultii      | ****                             | *****              | ?                      |
| C. azoricum    |                                  | no                 | ?                      |
| C. arietinum   | yes                              | yes                | yes                    |
| C. lunula      | yes                              | yes                | yes                    |
| C. carnegiei   |                                  |                    | ?                      |
| C. paradoxides | ****                             | yes                | yes                    |
| C. platycorne  | yes                              | yes                | yes                    |
| C. ranipes     | yes                              | yes                | yes                    |
| C. trichoceros | yes                              | no                 | yes                    |
| C. vultur      | a                                | yes<br>b           | yes                    |
| C. horridum    | 0 0 0 0                          | b                  | yes                    |
| C. tenue       | yes                              | yes                | yes                    |
| C. arcticum    |                                  |                    | ?                      |
| C. longissimum | yes                              | yes                | yes                    |
| C. hexacanthum |                                  | yes                | no                     |
| C. reflexum    | ****                             | yes                | yes                    |

<sup>?</sup> indicates either insufficient data or that the results were not conclusive. <sup>a</sup>Favillardii. <sup>b</sup>Molle and claviger.

#### THE CERATIUM SPECIES OF THE CARNEGIE COLLECTION

#### Systematic List

Subgenus POROCERATIUM

1. C. praelongum (Lemmermann) Kofoid 2. C. cephalotum (Lemmermann) Jörgensen

3. C. gravidum Gourret

II. Subgenus BICERATIUM

4. C. digitatum Schütt

5. C. candelabrum (Ehrenberg) Stein

6. C. furca (Ehrenberg) Dujardin

7. C. belone Cleve

8. C. incisum (Karsten) Jörgensen

9. C. pentagonum Gourret subsp. tenerum Jörgensen subsp. pacificum n. subsp.

10. C. subrobustum (Jörgensen) Nielsen 11. C. teres Kofoid

12. C. kofoidii Jörgensen 13. C. böhmii n. sp. 14. C. lineatum (Ehrenberg) Cleve

15. C. setaceum Jörgensen

III. Subgenus AMPHICERATIUM

16. C. geniculatum (Lemmermann) Cleve 17. C. bigelowii Kofoid 18. C. inflatum (Kofoid) Jörgensen

19. C. longirostrum Gourret 20. C. falcatum (Kofoid) Jörgensen 21. C. extensum (Gourret) Cleve

22. C. fusus (Ehrenberg) Dujardin

IV. Subgenus EUCERATIUM

23. C. tripos (O. F. Müller) Nitzsch subsp. atlanticum Ostenfeld subsp. semipulchellum Jörgensen

24. C. pulchellum Schröder
25. C. humile Jörgensen
26. C. breve (Ostenfeld and Schmidt) Schröder

27. C. compressum Gran

28. C. euarcuatum Jörgensen 29. C. filicorne Nielsen

30. C. symmetricum Pavillard var. symmetricum (Pavillard) var. coarctatum (Pavillard) var. orthoceros Jörgensen

31. C. axiale Kofoid

32. C. aultii n. sp.

33. C. azoricum Cleve 34. C. petersii Nielsen

35. C. arietinum Cleve subsp. arietinum (Cleve) subsp. bucephalum (Cleve)

subsp. gracilentum (Jörgensen)

36. C. declinatum Karsten

37. C. gibberum Gourret

f. subaequale Jörgensen 38. C. concilians Jörgensen

var. subaequale n. var.

39. C. lunula Schimper 40. C. carnegiei n. sp. 41. C. contortum Cleve 42. C. limulus Gourret

43. C. paradoxides Cleve

44. C. platycorne Daday

45. C. ranipes Cleve 46. C. macroceros (Ehrenberg) Vanhöffen subsp. macroceros (Ehrenberg) subsp. gallicum (Kofoid)

47. C. massiliense (Gourret) Jörgensen

48. C. deflexum (Kofoid) Jörgensen

49. C. carriense Gourret

50. C. contrarium (Gourret) Pavillard 51. C. trichoceros (Ehrenberg) Kofoid

52. C. vultur Cleve

var. vultur (Cleve)

var. japonicum (Schröder)

var. sumatranum (Karsten)

var. pavillardii (Jörgensen)

var. regulare n. var.

var. reversum n. var.

var. recurvum Jörgensen 53. C. horridum Gran

var. horridum (Gran)

var. molle (Kofoid)

var. claviger (Kofoid) 54. C. tenue Ostenfeld and Schmidt

var. inclinatum (Kofoid) Jörgensen var. tenuissimum (Kofoid) Jörgensen 55. C. longissimum (Schröder) Kofoid

56. C. arcticum (Ehrenberg) Cleve

var. arcticum (Ehrenberg) Cleve var. longipes (Bailey) Gran

var. ventricosum Ostenfeld

57. C. hexacanthum Gourret 58. C. reflexum Cleve

#### Subgenus POROCERATIUM

1. Ceratium praelongum (Lemmermann) Kofoid Figure 1, chart 1, appendix table 1

A rare, strictly tropical species, confined to stations where the surface temperature was over 20° C. Found in the Gulf Stream to where the surface temperature dropped to 20.°5 (station 15); also sporadically in the Sargasso and Caribbean seas. Peters (1934) did not find it farther south than 25° south latitude in the South Atlantic. At Carnegie stations it was found as far north

as 38.°5 north (station 15).

In the Pacific Nielsen (1934) reported it at various stations in the South Equatorial Current. Okamura (1912) found it at Japan, but it was not reported from the Pacific by Böhm (1931). In the southeastern Pacific, in the Carnegie collections, it was found at one station in the Humboldt Current (station 69), at two stations south of Easter Island, and at eight scattered stations in the South Equatorial Current. It was found continuously in the two series of stations across the equatorial currents in the central and western Pacific; at one station between Guam and Japan, at two stations off Japan, and at one station off California. It was not found farther north than latitude 35° north in the North Pacific, nor farther south than 32° south in the South Pacific. It was notably absent from the loop of stations northeast of Hawaii and in the Galapagos-Panama region.

Ceratium praelongum was never found in great numbers. In the Carnegie collection it was found only at forty stations--seven in the Atlantic and thirty-three in the Pacific. There were sixty-seven records of occurrence, fifty-one of which were rare and sixteen occasional. Forty-nine of the records were from net samples, eight-

een from pump samples.

Ceratium praelongum is a shade species according to Nielsen (1934). In the Carnegie collection it was found more frequently at 50 meters than at the surface or 100 meters, and more often at 100 meters than at the surface (table 2). Thus, the Carnegie data tend to substantiate Nielsen's classification of this species as a shade form.

Table 2. Records of occurrence of C. praelongum at three levels

| Occur-             |         | Ι          | epth,in | meter      | S       |     |  |
|--------------------|---------|------------|---------|------------|---------|-----|--|
| rence              |         | 0          |         | 0 50       |         | 100 |  |
| rence              | A       | В          | A       | В          | A       | В   |  |
| Rare<br>Occasional | 12<br>5 | 3.1<br>1.3 | 28<br>6 | 9.9<br>2.1 | 11<br>5 | 4.3 |  |
| Total              | 17      | 4.4        | 34      | 12.0       | 16      | 6.3 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

Although <u>C. praelongum</u> was limited to warm water it did not show any preference for oligotrophic water. Only sixteen of the sixty-seven records were in water containing less than 10 mg PO4/m³. The surface temperatures at the stations where it occurred, varied from 20°.4 to 29°.4 C. The ranges of environmental conditions in situ were: temperature, 14°.2 to 29°.4 C; salinity, 33.4 to 37.1 per mille; pH, 7.87 to 8.47; phosphate, 2 to 63 mg PO4/m³.

Remarks. -- Dissections were made of the plates of C. praelongum. The pattern is shown in ventral and left lateral views in figures 1A and B. It will be noted that in this species two apical plates touch the ventral area, whereas Jörgensen (1911) stated that in the subgenus Poroceratium only the large flat ventral apical touches the ventral area. Kofoid (1907b) devised a nomenclature for the plates of Ceratium. For Poroceratium he started numbering the apical plates with the wide ventral one, basing his system on the pattern of C. gravidum in which this plate is the only one to touch the ventral area. Thus he called this one the apical plate. Jörgensen (1911), on the other hand, called it apical four. A knowledge of the pattern of C. praelongum, a member of Poroceratium, shows that Jörgensen's system is preferable in that it indicates homologies. The suture in C. praelongum, which separates the ventral and left apical plates, is homologous with the ventral suture of C. tripos, which separates the first and fourth apicals, so that the ventral plate of Poroceratium is homologous with the fourth of C. tripos and should be designated apical 4 as in Jörgensen's system. Ceratium praelongum, in its epithecal plate pattern, is thus transitional between other members of Poroceratium and Euceratium.

<u>Variation.</u>--There is considerable variation in the shape of the body of <u>C. praelongum</u> but the variants seemed to bear no relation to geographic location or environmental conditions. The forebody may be constricted just anterior to the girdle as in figure 1A, or in the middle region (fig. 1C), or may be quite regular as in figure 1D. The last figure shows an individual with very heavy hypothecal walls and thick antapical horns. None of the variations found could be satisfactorily grouped into varieties.

## 2. Ceratium cephalotum (Lemmermann) jörgensen Figure 2, chart 2, appendix table 2

This is a rare, intolerant tropical species. Jörgensen (1911) stated that it has been reported from the North Atlantic only north of the West Indies; Peters (1934) found it only at one station in the South Atlantic. In the <u>Carnegie</u> collection it was found in the Atlantic at

two stations between the North Atlantic Drift and the Sargasso Sea at 100 meters in both cases.

The species is never found in great numbers. In the <u>Carnegie</u> collection it was found at a total of thirty-two stations; two in the Atlantic, thirty in the Pacific. There were thirty-nine records of occurrence--thirty-six rare and three occasional. Thirty-six of the records were from the net samples; three from the pump samples.

Ceratium cephalotum is a shade species according to Nielsen (1934), and this classification is substantiated by the <u>Carnegie</u> data as shown in table 3. It was found in an increasing percentage of the samples with increase in depth. Although Nielsen found it only in the samples taken between 100 to 50 meters, in the <u>Carnegie</u> collection it was found almost as frequently at the surface as at 50 meters.

Table 3. Records of occurrence of C. cephalotum at three levels

| Occur-             |         | D          | epth ir       | meter      | S       |             |
|--------------------|---------|------------|---------------|------------|---------|-------------|
| rence              | 0       |            | 5             | 50         | 10      | 00          |
|                    | A       | В          | Α             | В          | A       | В           |
| Rare<br>Occasional | 12<br>1 | 3.2<br>0.2 | 9<br><b>2</b> | 3.2<br>0.7 | 15<br>0 | <b>5.</b> 9 |
| Total              | 13      | 3.4        | 11            | 3.9        | 15      | 5.9         |

A=Number of records. B=Per cent of total number of samples collected at that depth.

The <u>Carnegie</u> data suggest that this species prefers oligotrophic water. It is always found in warm water. The surface temperatures of the water at the stations where it was found varied from 23.°6 to 29.°4 C. Twenty-four of the thirty-nine records were in water containing less than 10 mg PO4/m³. It is particularly noteworthy in this connection that the species was found in a continuous series of stations north and east of Hawaii and all are included in the great "desert" of the North Pacific. Peters' (1934) record for the South Atlantic was also in oligotrophic water. The ranges of environmental conditions in <u>situ</u> were: temperature, 13.°8 to 28.°7 C; salinity, 34.1 to 36.5 per mille; pH, 8.17 to 8.47; phosphate, 4 to 36 mg PO4/m³.

<u>Ceratium cephalotum</u> is not very variable. Sometimes the overgrowth of the right side is less pronounced (fig. 2B).

## 3. Ceratium gravidum Gourret Figures 3 and 4, chart 3, appendix table 3

This is a relatively rare, but widespread, slightly tolerant tropical species found at most of the <u>Carnegie</u> tropical stations. Peters (1934) found it only in warm oligotrophic water in the South Atlantic. In the <u>Carnegie</u> collection it was found at most (seventeen) of the twenty-three stations in the warm Atlantic region. It was not found at any Atlantic station where the surface temperature was less than 20° C. All the Atlantic stations were in oligotrophic water with phosphate content less than 10 mg at the surface, except at station 1 where it was thirty-two. The temperature there, however, was 24°.

In the Pacific Nielsen (1934) found <u>C. gravidum</u> in both eutrophic and oligotrophic water at scattered stations

in the South Pacific. In the <u>Carnegie</u> collection it was pretty well scattered throughout the tropical waters of the Pacific, occurring at seventy-five stations and sometimes in water of somewhat lower temperature than that of the Atlantic. Off Japan it occurred to 40.5 north, surface temperature 15.9 C (station 117). Off California it occurred to 34° north, surface temperature 19.1 C (station 31). In the southeastern Pacific it occurred south of Easter Island to 34° south, surface temperature 19° C (station 57). In the extreme southeastern Pacific it was not common, occurring at only four stations east of the line of stations in the longitude of Easter Island.

Although widespread, this species is never very abundant. There were 182 records of occurrence, 144 of which were rare and 38 occasional. Of these records, 164 were from the net samples and 18 from the pump samples.

Ceratium gravidum was classified as a shade species by Nielsen (1934). In oligotrophic water he found that it had its main distribution in the levels from 200 to 100 meters, although he found it in the upper levels in eutrophic water. The Carnegie data substantiate this classification of Nielsen. The total number of records (in percentage) at 50 meters is more than three times that at the surface; the number of 100-meter records shows an increase over that for 50 meters (see table 4). This distribution is shown also by the rare and occasional records separately. Thus, C. gravidum is a decided shade species.

Table 4. Records of occurrence of C. gravidum at three levels

| Occur-             | Depth in meters |            |          |             |          |             |
|--------------------|-----------------|------------|----------|-------------|----------|-------------|
| rence              | 0               |            | 0 50     |             | 100      |             |
|                    | A               | В          | A        | В           | A        | В           |
| Rare<br>Occasional | 27<br>3         | 7.7<br>0.8 | 58<br>14 | 20.5<br>3.6 | 59<br>21 | 23.0<br>8.3 |
| Total              | 30              | 8.5        | 72       | 24.1        | 80       | 31.3        |

A=Number of records. B=Per cent of total number of samples collected at that depth.

In the <u>Carnegie</u> collection as a whole, <u>C. gravidum</u> seemed to be found in both oligotrophic and eutrophic water. Sixty-one of the 182 records of occurrence were in water containing less than 10 mg PO4/m<sup>3</sup>. The surface temperatures at the stations where it occurred, varied from 15.9 to 29.5 C. The ranges of environmental conditions in situ were: temperature, 10.6 to 29.3 C; salinity, 33.4 to 37.0 per mille; pH, 7.76 to 8.44; phosphate, 2 to 153 mg PO4/m<sup>3</sup>.

Variation.--Ceratium gravidum is a variable species. Jörgensen (1911) divided it into three varieties and later (1920) described a fourth variety. These have been more or less accepted by later workers (Nielsen, 1934 and Peters, 1934), although apparently no one hitherto has had sufficient material to test the validity of these varieties. In the Carnegie studies hundreds of specimens were examined, and it was evident that no taxonomic grouping could be made of the wide variations in body form found in this species. Representative specimens are shown in figures 3 and 4. Each of these drawings is representative of a group of individuals examined and other variations between these were found. Thus, there

is a complete intergradation between the wide rotund form shown in figure 3A (which is even wider than Jörgensen's var. latum) and the narrow form shown in figure 4U (which, in turn, is narrower than lorgensen's var. angustum). The characteristics of the antapical horns such as length, thickness, curvature, and divergence (which have also been used in differentiating the varieties) also vary in such a manner that no varietal segregations are indicated. An attempt was made to correlate the variations of C. gravidum with geographic location, or with different water masses. No correlation was found; the different variations were indiscriminately scattered throughout the areas investigated. (1934) found the different varieties in the same regions of the South Atlantic. Nielsen (1934) found var. latum to be restricted to the eutrophic water of the eastern part of the South Equatorial Current, whereas var. elegans and angustum were found there as well as in the oligotrophic western part and in the East Australian Current. Nielsen's results are not corroborated by the Carnegie collections. In the latter, specimens as wide or wider than var. latum were, indeed, found in the eutrophic water in the region of the Galapagos Islands, but they also occurred in the oligotrophic water of the central part of the North Equatorial Current.

#### Subgenus BICERATIUM

4. Ceratium digitatum Schütt Figure 5, chart 4, appendix table 4

This is a rare intolerant tropical species, one of the most rare of the <u>Carnegie</u> collection. It is apparently restricted to warm water as it never approached the 20° surface isotherm except in the region of Easter Island. It is also remarkable that it was never found near large land masses, although Jörgensen (1920) found it in the Mediterranean. Peters (1934) found it at only four stations in the South Atlantic in his "main distribution region" of warm oligotrophic water. On the <u>Carnegie</u> cruise it was found only at two stations in the Atlantic, in the North Equatorial Current.

Nielsen (1934) is the only previous author to report C. digitatum from the Pacific. He found it at three widely separated stations in the South Equatorial Current. In the Carnegie collection it was found at twenty-three widely separated stations, from Easter Island to Guam and to a point midway between Hawaii and California. The most northern station is 33.5 north; the most southern, 31.5 south. On the German South Polar expedition C. digitatum was found to 31° south. This seemed extraordinary to Peters (1934) who did not find it farther south than 20° south on the Meteor expedition. He explained the fact by stating that it was probably carried south in the Agulhas Current. The Carnegie southern records in the southeastern Pacific may thus be explained by a drift from the northeast, in the large vortex characteristic of that region. The absence of this species off Japan, however, where it should be carried by the extension of the North Equatorial and Japan currents, and in the North Atlantic Drift, are noteworthy and can only be explained on the assumption that the species is so rare that its detection anywhere in the ocean must be considered fortuitous. Its limits of distribution, thus, will not be well defined until much more survey work has been done.

Ceratium digitatum is always found singly or in small

numbers. In the <u>Carnegie</u> collection there were twentysix records of its occurrence--all rare. Eighteen of these records were from net samples, eight from pump samples.

This species is undoubtedly a shade species, although previously insufficient data have been at hand to demonstrate this. Jörgensen (1920) found it in the Mediterranean at the deeper levels in the summer but attributed this occurrence to another cause (see p. 12). Nielsen (1934) considered it a shade species, although his few data were from above the 50-meter level. Since two of his three records for this species were from stations rich in plankton, however, the occurrence above this level does not necessarily indicate that it is not a shade species. The <u>Carnegie</u> records substantiate Nielsen's classification of this species as a shade species. It was found more frequently with increase in depth (table 5).

Table 5. Records of occurrence of C. digitatum at three levels

| Occur- |    | Depth in meters |   |     |    |     |  |
|--------|----|-----------------|---|-----|----|-----|--|
| rence  | (  | 0               |   | 50  | 10 | 00  |  |
| rence  | A  | В               | A | В   | A  | В   |  |
| Rare   | _6 | 1.5             | 8 | 2.1 | 12 | 4.7 |  |
| Total  | 6  | 1.5             | 8 | 2.1 | 12 | 4.7 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

It is doubtful if <u>C. digitatum</u> prefers oligotrophic water. Ten of the twenty-six <u>Carnegie</u> records were from water containing less than 10 mg PO4/m³. This is not owing to the fact that most of the records are subsurface records. The phosphate content of the surface water at the stations where the species was found shows the same distribution. Ten of these are below 10 mg and the rest above, with some as high as 42. The surface temperatures at the stations where <u>C. digitatum</u> occurred, varied from 22.°4 to 29.°4 C. The ranges of environmental conditions <u>in situ</u> were as follows: temperature, 12.°5 to 28.°5 C; salinity, 34.3 to 36.5 per mille; pH, 8.16 to 8.39; phosphate, 3 to 46 mg PO4/m³.

Variation .-- Very few variations have been reported for this species, probably owing to scanty material. Jörgensen (1920), however, described a variant, var. rotundatum, found in the Mediterranean and also in the Guinea Current. It is characterized by more rounded apex, less bent apical horn, and somewhat larger size. Peters (1934) stated that in the South Atlantic he found specimens with more rounded epitheca than Jörgensen's variety. In the Carnegie collection two specimens were found which answer well to Jörgensen's var. rotundatum. They occurred in the surface samples from stations 52 and 54, both south of Easter Island in temperatures of 22.°5 and 23.°4 C (figs. 5A and B). It is probable that this form represents a species distinct from C. digitatum as no intergrades were found between it and the typical form. The typical C. digitatum does not vary greatly, although the length of the left antapical horn varies somewhat in different specimens (figs. 4C and E).

5. Ceratium candelabrum (Ehrenberg) Stein Figure 6, chart 5, appendix table 5

This is a common, slightly tolerant tropical species. It is not confined to warm water. At Carnegie stations the limits of distribution paralleled rather closely the surface isotherm of 15° C in all three regions where the lines of stations extended into colder regions, namely, in the southeastern Pacific, off Japan, and off the west coast of the Americas. These limits of distribution are very significant, inasmuch as within these limits there are extremely few stations without records of occurrence. At six stations off Peru it was not found, although the surface temperatures there were above 19° C. Apparently the peculiar environmental conditions in this region have an inhibitory effect on C. candelabrum. In the Atlantic the species occurred almost continuously in the warmer water, but its northern limit there coincided with the surface isotherm of 20° C rather than of 15° as in the Pacific. In respect to latitude, C. candelabrum was found approximately to 40° south and 40° north in the Pacific, and to 42° north in the Atlantic. Its southern limit in the South Atlantic is also at about 40° south (Peters, 1934). Some of the stations of the Dana expedition extend, in the southwestern Pacific, beyond 40° south. The southern records of C. candelabrum, however, end at the fortieth parallel. This rounds out a remarkable correlation between latitude and the distribution of a Ceratium. It must be mentioned, however, that in the southwestern Pacific, as well as in other parts of the Pacific, the latitudes of 40° are closely paralleled by the surface isotherms of 15° C.

This species is one of the most common of the genus. In the <u>Carnegie</u> collection it was found at 136 stations--26 in the Atlantic and 110 in the Pacific. There were 353 records of occurrence--206 rare, 128 occasional, and 19 common. Of these, 243 were from net samples and 110 from pump samples.

In regard to vertical distribution, Neilsen (1934) classified this species as a surface form. This classification is substantiated by the <u>Carnegie</u> observations. As can be seen in table 6, <u>C. candelabrum</u> was found most frequently at 50 meters (44.2 per cent of the 50-meter samples). It was found almost as often (36.0 per cent of the surface samples) at the surface, but only half as frequently at 100 meters (21.0 per cent). It is more significant that the records of occasional and common occurred much more frequently at the surface and 50 meters than at 100 meters.

Table 6. Records of occurrence of C. candelabrum at three levels

| Occur-                       |               | Depth in meters     |               |                     |               |                    |  |
|------------------------------|---------------|---------------------|---------------|---------------------|---------------|--------------------|--|
| rence                        | 0             |                     | 0 50          |                     | 1             | 00                 |  |
| 201100                       | A             | В                   | A             | В                   | A             | В                  |  |
| Rare<br>Occasional<br>Common | 75<br>57<br>8 | 18.4<br>13.4<br>2.1 | 81<br>42<br>5 | 28.4<br>14.2<br>1.7 | 50<br>29<br>6 | 20.0<br>0.8<br>0.2 |  |
| Total                        | 140           | 33.9                | 128           | 44.3                | 85            | 21.0               |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

Ceratium candelabrum was found throughout the warm-water regions without respect to the nutrient content of the water. Thus, 117 of the 353 records of occurrence were in water containing less than 10 mg PO4/m³. The range of surface temperatures at the stations where it occurred was from 15.9 to 29.5 C. The ranges of environmental conditions in situ were: temperature, 8.8 to 29.5 C; salinity, 30.0 to 37.1 per mille; pH, 7.76 to 8.47; phosphate, 3 to 189 mg PO4/m³.

Variation. --Several varieties of <u>C. candelabrum</u> have been described, the most important of which are var. <u>depressum</u> Jörgensen (1920) and f. <u>commune</u> Böhm (1931). Nielsen (1934) distinguished these two variations and stated that both are found in the western part of the Pacific investigated by him but only var. <u>depressum</u> was found in the eastern Pacific. The writers are inclined to agree with Peters (1934) that the variations in this species are too continuous for any separation of varieties, although it must be stated that most of the <u>Carnegie</u> material resembled the var. <u>depressum</u> form. Figure 6 shows a series of specimens with variously bent horns, both apical and antapical, and with various lengths of horns.

## 6. Ceratium furca (Ehrenberg) Dujardin Figure 7, chart 6, appendix table 6

Ceratium furca is an interesting cosmopolitan species probably composed of many subspecies or races. Jörgensen (1911) designated two subspecies; a northern form, subsp. α berghii and a tropical form, β eugrammum. Ceratium hircus Schröder, which Jörgensen accepted as an independent species, is probably also a variety of C. furca. In his study of Mediterranean Ceratia, Jörgensen (1920) designated many more varieties. Böhm (1931) attempted to show that in his material from the western Pacific there were two genotypes, both belonging to the tropical subspecies eugrammum. These were separated on the basis of total length; a short variety with length from 130 to 168 microns, and a large variety from 170 to 244 microns. Nielsen (1934) did not consider Böhm's evidence conclusive, and made a statistical study of length in his material from the South Pacific. In only one sample did he find a separation into two groups on this basis. In other samples long ones or short ones were represented, and often medium-sized ones. Nevertheless Nielsen considered that two races were represented.

As a result of the study of the <u>Carnegie</u> material the writers tend toward Jörgensen's (1920) opinion, that the species is a complex of many varieties and races, not of two. No separation could be made on the basis of size alone. No attempt was made to separate the different variants. The number is great and the intergradations common. In figure 6 several variants are shown.

The distribution of <u>C. furca</u> is of particular interest. Peters (1934), in his study of the Ceratia of the <u>Meteor</u> expedition in the South Atlantic, concluded that <u>C. furca</u> is a typically neritic species. It was found abundantly in the mouths of great rivers and in regions of upwelling. It seemed to avoid the middle regions of the oceans. Nielson (1934) accepted this classification of the species and stated that it is distinctly a neritic form, although also found at many oceanic stations. He found it at every station but two between Panama and Tahiti, and at various stations between that point and Australia. He stated that

its occurrence at these oceanic stations can be explained by the disturbed water about the islands in the western Pacific and by the eutrophic water occurrence in the eastern part of the South Equatorial Current. Such a broad use of the term "neritic," however, leaves no room for the term oceanic so such usage cannot be accepted. Nielsen's data show, on the other hand, that <u>C. furca</u> is oceanic as well as neritic. In the <u>Carnegie</u> collection the species did show a tendency to occur more frequently and more abundantly in richer water but, nevertheless, was often found in oligotrophic water. Only 40 of the 231 records of occurrence were in water containing less than 10 mg PO4/m<sup>3</sup>.

In the <u>Carnegie</u> collection there is no indication of an avoidance of oceanic water or of the middle regions of the open oceans on the part of <u>C. furca</u>. Not only are there many station records for the open North Atlantic and the Pacific, but there are as many records of occasional and common for stations remote from land as for

stations close to land (see chart 6).

In the Atlantic there were two distributional areas, probably representing the distributions of the two subspecies; a northern one from stations 6 to 11a (from southwest of Ireland around the North Sea and Iceland to southeast of Greenland), and a tropical region from stations 14 to 24 (straight down through the middle of the Atlantic). There was also one station in the Caribbean. In the Pacific, also, the distribution was interrupted. The species was found quite regularly in the southeastern Pacific, but was scattered irregularly over the other tropical regions of the Pacific. It was notably absent from the northern line of stations from stations 118 to 128 inclusive. No northern form was found in this ocean.

The surface temperatures in this "C. furca-free" water in the northern Pacific varied from 7.2 to 16.4 C. This should not have constituted a barrier to this species as it was found in the Atlantic where the surface temperatures were as low as 8.9. The tropical subspecies was confined to warm water in the Atlantic (surface temperatures 21.2 to 28.0 C), but in the Pacific it extended into somewhat cooler water (surface temperatures from 15.0 to 29.4 C). Obviously the northern subspecies of the Atlantic was not found in the Pacific.

Ceratium furca is frequently found in quantities. Records of "abundant" were from the North Sea, southeastern Pacific, and southeast of Japan. The species was found at 91 Carnegie stations--19 in the Atlantic and 72 in the Pacific. There were 232 records of occurrence, with 140 rare, 65 occasional, 22 common, and 4 abundant.

Nielsen (1934) classified <u>C. furca</u> as a surface form. The <u>Carnegie</u> data show that it is truly not a shade form,

Table 7. Records of occurrence of C. furca at three levels

| Occur-                                   | Depth in meters     |                           |                    |                    |                    |                    |  |  |
|--|---------------------|---------------------------|--------------------|--------------------|--------------------|--------------------|--|--|
| rence                                    | 0                   |                           | 50                 |                    | 100                |                    |  |  |
|  | A                   | В                         | A                  | В                  | A                  | В                  |  |  |
| Rare<br>Occasional<br>Common<br>Abundant | 68<br>36<br>14<br>4 | 17.7<br>9.5<br>3.6<br>1.4 | 42<br>14<br>3<br>0 | 14.9<br>4.9<br>1.6 | 30<br>15<br>5<br>0 | 11.8<br>5.9<br>1.8 |  |  |
| Total                                    | 122                 | 32.2                      | 59                 | 21.4               | 50                 | 19.5               |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

but is found at depths below the surface in a great many cases. The table of frequencies (table 7), however, shows that it was found most frequently at the surface. This is particularly true of the records of "common" and "abundant."

The ranges of environmental conditions in situ were as follows: temperature, 6.6 to 29.4 C; salinity, 33.1 to 37.0 per mille; pH, 7.68 to 8.47; phosphate, 3 to 233 mg  $PO4/m^3$ .

#### 7. Ceratium belone Cleve Figure 8, chart 7, appendix table 7

This is a rare, intolerant tropical species confined to water of high temperature. Peters (1934) found the species in the South Atlantic not beyond 30° south. Nielsen (1934) found it in the Pacific scattered over the entire region of the South Equatorial Current.

In the <u>Carnegie</u> collection <u>C. belone</u> was found at twenty-six stations; two in the Atlantic and twenty-four in the Pacific. The Atlantic records were in the middle North Atlantic where the surface temperatures were about 24° C (station 1b) and 27.0° C (station 18). The most northern of these was at 38° north latitude.

In the Pacific C. belone was found at one station off Peru, at eleven stations around and north of Easter Island, at seven stations east and north of Samoa, at one station in the North Equatorial Current, and at three stations in the central North Pacific (chart 7). Its latitudinal limits were 33.5 north and 32.0 south, which is a rather limited distribution for a species of Ceratium. It is a curious and unexplainable fact that the species was not found west of 179° west longitude. The surface temperatures at the Pacific record stations varied from 20.°4 to 29.°4 C. It must, therefore, be considered a stenothermal species. Although it always occurred in water of high temperature, it was seldom found in water of extremely low phosphate content. Only six of the fiftyone records of occurrence were from water containing less than 10 mg PO4/m<sup>3</sup>.

The ranges of environmental conditions in situ were: temperature, 16.0 to 29.4 C; salinity, 34.1 to 37.0 per mille; pH, 8.11 to 8.47; phosphate, 5 to 48 mg PO<sub>4</sub>/m<sup>3</sup>.

Nielsen's (1934) classification of <u>C. belone</u> as a surface species is substantiated by the <u>Carnegie</u> data (table 8), although there were two records of "occasional" at 100 meters. The total percentages, however, show a much more frequent occurrence at the surface than at the lower levels.

The occurrence of <u>C. belone</u> is sporadic. Unlike some of the rarer tropical species, when it does occur, it is sometimes found in considerable numbers. Peters (1934) found this to be true in the South Atlantic. Likewise in the <u>Carnegie</u> collection there were several records of "occasional." The total number of records was fifty-one, of which forty-four were rare and seven were occasional.

<u>Variation.--Ceratium</u> belone is rather constant in shape and size, except for the divergence of the antapical horns and the length of the apical horn. There is an extreme variation in the total length of the specimens (from 335 to 910 microns), but this difference is owing entirely to the difference in the length of the apical horn. The length of the hypotheca is constant. In only one specimen (fig. 8H) was this elongate. The diameter, <u>d</u>, varied from 20 to 30 microns.

Table 8. Records of occurrence of C. belone Cleve at three levels

| Occur-     | Depth in meters |     |    |     |     |     |  |
|------------|-----------------|-----|----|-----|-----|-----|--|
| rence      |                 | 0   |    | 50  | 100 |     |  |
| 101100     | A               | В   | A  | В   | A   | В   |  |
| Rare       | 23              | 6.0 | 10 | 3.5 | 11  | 4.3 |  |
| Occasional | 4               | 1.0 | 1  | 0.4 | 2   | 0.8 |  |
| Total      | 27              | 7.0 | 11 | 3.9 | 13  | 5.1 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

## 8. Ceratium incisum (Karsten) Jörgensen Figure 9, chart 8, appendix table 8

This is a rare, strictly tropical species with limited distribution. Peters (1934) found it at only four stations in the South Atlantic, and Nielsen (1934) found it at scattered stations in the South Equatorial Current of the Pacific. In the <u>Carnegie</u> collection it occurred at twenty-seven stations—two in the Atlantic and twenty-five in the Pacific. There were thirty records of occurrence, all rare. Twenty—two of these were from net samples and eight were from pump samples.

Of the two Atlantic stations, one was in the open Atlantic at latitude 36.5 north, longitude 46.5 west (station 16); the other was in the Caribbean Sea. In the Pacific the stations were scattered: one off Ecuador, six north of Easter Island at about latitude 10° south, twelve between Samoa and Guam, four in the central crossing of the equatorial regions, and two north of Hawaii. It was very restricted in its latitudinal distribution and was absent from the southeastern Pacific region except at one station off Ecuador. Its latitudinal limits in the Pacific were 29° north and 15° south. In the Atlantic it occurred to 36.5 north.

<u>Ceratium incisum</u> is a stenothermal form similar to <u>C. belone</u>. The surface temperatures at stations at which it occurred in the Atlantic were 25.9 and 28.5 C. In the Pacific the range was 24.6 to 29.5 C. The ranges of environmental conditions in situ were: temperature, 14.2 to 29.3 C; salinity, 33.7 to 36.3 per mille; pH, 7.87 to 8.39; phosphate, 4 to 48 mg PO<sub>4</sub>/m<sup>3</sup>.

Apparently <u>C. incisum</u> is at home in oligotrophic water. Ten of the thirty records of occurrence were in water containing less than 10 mg PO4/m<sup>3</sup>. Nielsen (1934) classified this species as a surface species. In the <u>Carnegie</u> collection it was found about equally at the three levels (table 9).

Table 9. Records of occurrence of C. incisum at three levels

| Occur- | Depth in meters |     |   |     |     |     |  |  |
|--------|-----------------|-----|---|-----|-----|-----|--|--|
| rence  | 0               |     | 5 | 0   | 100 |     |  |  |
|        | A               | В   | A | В   | A   | В   |  |  |
| Rare   | 11              | 2.9 | 9 | 3.2 | 10  | 3.9 |  |  |
| Total  | 11              | 2.9 | 9 | 3.2 | 10  | 3.9 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

9. Ceratium pentagonum Gourret Figures 10C, D, H-N, chart 9, appendix table 9

This is a cosmopolitan species composed of three subspecies: a widespread tropical form, subsp. tenerum (Jörgensen); a subantarctic form, subsp. robustum (Cleve); and a northern Pacific form, subsp. pacificum n. subsp. The authors agree with Nielsen (1934) that Jörgensen's var. subrobustum is specifically distinct (see below).

Subspecies tenerum is a widespread tropical form somewhat more common than <u>C. subrobustum</u>, but with a similar distribution except that it seems to be somewhat more tolerant of colder water. It was found at eighty-one stations--fifteen in the Atlantic and sixty-eight in the Pacific. There were 139 records of occurrence: 152 rare, 34 occasional, and 1 common. Of these records, 73 were from net samples, 114 from pump samples. Expressed in percentages these are: 13.6 per cent of net samples, and 31.8 per cent of pump samples. It is thus evident that the tropical form of <u>C. pentagonum</u> is too small to be properly collected in the tow nets.

The subspecies was found in the Atlantic mostly in the central line of stations; it was absent from the warmer part of the Gulf Stream and Caribbean Sea. In the Pacific its distribution is somewhat irregular, but the records are probably incomplete there, owing to the fact that the distinctness of <u>C. subrobustum</u> was not realized at the time of the routine census of the samples, so some of its records probably belong to <u>C. pentagonum</u>. Ceratium pentagonum, however, extended beyond the range of <u>C. subrobustum</u> in the southeastern Pacific and off California.

The surface temperatures at the stations at which subsp. <u>tenerum</u> occurred, varied from 15.0 to 29.3 C. The ranges of environmental conditions <u>in situ</u> were: temperature, 13.1 to 29.3 C; salinity, 33.4 to 37.0 per mille; pH, 7.76 to 8.47; phosphate, 3 to 233 mg PO4/m<sup>3</sup>.

Nielsen (1934) listed <u>C. pentagonum</u> as a surface species. In the <u>Carnegie</u> collection it was found less frequently at 100 meters than at the surface and 50-meter depths, and slightly more frequently at 50 meters than at the surface. Thus it cannot be classed as a shade species. <u>Ceratium subrobustum</u>, on the other hand, is definitely a shade species, with its greatestfrequency at 100 meters (cf. tables 10 and 11).

Table 10. Records of occurrence of C. pentagonum subsp. tenerum at three levels

| Occur-       | Depth in meters |      |    |      |    |      |  |
|--------------|-----------------|------|----|------|----|------|--|
| rence        |                 | 0 50 |    | 50   | 1  | 00   |  |
| Tence        | A               | В    | A  | В    | A  | В    |  |
| Rare         | 56              | 14.5 | 56 | 19.1 | 40 | 15.3 |  |
| Occasional . | 18              | 4.6  | 11 | 4.0  | 5  | 1.6  |  |
| Common       | 1               | 0.2  | 0  |      | 0  |      |  |
| Total        | 75              | 19.3 | 67 | 23.1 | 45 | 16.9 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

<u>Ceratium pentagonum</u> is a remarkable species, in that it has never been collected from the cold northern Atlantic although it is represented in the subantarctic by a cold-water subspecies. In the <u>Carnegie</u> collection the distribution of the species in the North Atlantic

terminated under 45° north latitude (station 13a), which is somewhat farther north than previous authors had found it. The surface temperature there, however, was above 20° C. It apparently cannot endure transfer into temperatures much below this value.

The conspicuous absence of C. pentagonum in the northern Atlantic was particularly noted by Peters (1934) who mapped the distribution of subsp. robustum in the subantarctic waters of the South Atlantic. Peters emphasized the unequal distribution in which the species is represented in the southern cold water by the most southerly member of the genus, but is entirely absent in the cold waters of the North Atlantic. Subspecies robustum doubtless populates the entire subantarctic region as there are no barriers in this region. Thus, it probably occurs in the southern latitudes of the Pacific. Peters did not find it in the Atlantic north of about 48°, however. except where it was displaced along the South American coast by the Falkland Current to about 32° south. This subspecies was not found in the Carnegie collection probably because the stations were not far enough south. The most southern station (station 60) was at about 40° south. It is probable that the subspecies is displaced northward in the Humboldt Current to 30° or so, but in these latitudes the Carnegie stations were too far from the coast to detect it.

In view of this knowledge it was of particular interest to search for this species in the cold waters of the North Pacific. The investigations here revealed the presence of a cold-water subspecies peculiar to this region, subsp. pacificum n. subsp.

A series of forms was found south of the Aleutian Islands and they have been grouped together under this subspecies. The extreme form (fig. 10 I) is remarkably different from the other subspecies of <u>C. pentagonum</u>. It is large (transdiameter 78 microns), with heavy walls covered with thick ridges and lists, and the antapical horns are long (equal to the transdiameter or longer). All the forms in this cold-water region, however, do not conform to this description, and in the west grade into the southern form (see figs. 10C and J). Another variation is shown in figure 10D. These intergrades indicate that the extreme form is of subspecific rank only.

With the finding of this subspecies it was evident that in the case of <u>C. pentagonum</u> there is a bipolarity in the Pacific with subsp. <u>robustum</u> in the antarctic and subsp. <u>pacificum</u> in the north, whereas in the Atlantic only the southern form is represented. This distribution constitutes the most convincing evidence of the planktological isolation of the North Pacific waters (see p. 11).

Subspecies pacificum was found at seven stations and in seventeen samples (chart 9). The surface temperatures of the stations where it occurred, variedfrom 7.2 to 10.5 C. The ranges of environmental conditions in situ were: temperature, 4.2 to 10.5 C; salinity, 32.7 to 32.9 per mille; pH, 7.98 to 8.03; phosphate, 103 to 175 mg PO4/m<sup>3</sup>.

10. Ceratium subrobustum (Jörgensen) Nielsen Figures 10A, B, E-G, chart 10, appendix table 10

This is a rare, intolerant tropical species. Peters (1934) found this form in the South Atlantic only in the Falkland Current and for that reason considered it a subspecies, raising it from the varietal rank given by Jörgensen (1920). Nielsen (1934) found it in the Pacific

in the eastern part of the South Equatorial Current and at Australia, but not at the colder stations. He raised it to the rank of an independent species, and separated it from <u>C. pentagonum</u> on the basis of size of body and thickness of walls. He gave the transdiameter of <u>C. subrobustum</u> as 77 to 89 microns, and that of <u>C. pentagonum</u> up to 72 microns. In the <u>Carnegie</u> material the transdiameter of <u>C. robustum</u> varied from 72 to 90 microns; those of <u>C. pentagonum</u> (excluding subsp. pacificum n. subsp.) were from 38 to 66 microns. The transdiameter of subsp. pacificum was 55 to 78 microns.

Ceratium subrobustum is probably rarer than C. pentagonum but, nevertheless, it is much more widespread than previously was supposed. In the Carnegie collection it occurred at forty-five stations--two in the North Atlantic, where it had not been found before, and forty-three in the Pacific. There were eighty-one records of occurrence: sixty-three rare, fifteen occasional, and three common. Of these records, fifty were from net samples, and thirty-one were from pump samples. Unfortunately, when the routine examination of this species was not realized, so the records of its occurrence are not complete. For this reason, the peculiar clumping of the stations in the Pacific must be considered artificial and not representing exactly the actual distribution.

It may be noted that the species is a warm-water form, however, not extending into water of low temperature. The surface temperatures at the stations where it occurred, were all above 20°C except in the southeastern Pacific, where it was found at stations with surface temperatures as low as 17°C. The ranges of environmental conditions in situ were: temperature, 14.3 to 28.5 C; salinity, 34.0 to 39.8 per mille; pH, 7.17 to 8.39;

phosphate, 3 to 64 mg  $PO_4/m^3$ .

Nielsen (1934) stated that in the <u>Dana</u> collections <u>C. subrobustum</u> was found only in the upper 50 meters.

The <u>Carnegie</u> data are at variance with this and strongly suggest that the species is a shade species. As can be seen from table 11, the species was foundmore frequently with increase in depth to 100 meters. Particularly significant are the records of "occasional," which were found in 0.3 per cent of the surface samples, 2.1 per cent of the 50-meter samples, and 3.2 per cent of the 100-meter samples. In this respect <u>C. subrobustum</u> differs from <u>C. pentagonum</u>, which was found more frequently at 50 meters.

Table 11. Records of occurrence of C. subrobustum at three levels

| Occur-     | Depth in meters |     |    |     |    |      |  |
|------------|-----------------|-----|----|-----|----|------|--|
| rence      | 0               |     | 5  | 50  |    | 100  |  |
| Tenee      | A               | В   | A  | В   | A  | В    |  |
| Rare       | 12              | 2.8 | 16 | 5.7 | 35 | 13.0 |  |
| Occasional | 1               | 0.3 | 6  | 2.1 | 8  | 3.2  |  |
| Common     | _ 1             | 0.3 | 1  | 0.4 | 1  | 0.4  |  |
| Total      | 14              | 3.4 | 23 | 8.2 | 44 | 16.6 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

11. Ceratium teres Kofoid Figures 11B-D, chart 11, appendix table 11

This is a rare, slightly tolerant tropical species, although widespread. In the <u>Carnegie</u> collection it

occurred at sixty-two stations--twelve in the Atlantic, and fifty in the Pacific. There were 106 records of occurrence, with 85 rare and 21 occasional. The species is so small that it was collected more frequently in the pump samples. There were 30 net records and 76 pump records. Expressed in percentages these are 5.6 per cent of the net samples, 20.8 per cent of the pump samples.

In regard to geographic distribution, the species is rather too irregular to draw any conclusions. Its absence is particularly noticeable, however, in the region of Panama, Galapagos, and southward. It occurs, on the other hand, at Easter Island and south to 40° south.

Ceratium teres was mostly confined to warm water. In the Atlantic the surface temperatures at its record stations were all above 24.8 C; in the Pacific, above 20.6 C, except in the southeastern region where it was as low as 15.0 C (station 60). The ranges of environmental conditions in situ were: temperature, 11.4 to 29.4 C; salinity, 33.9 to 37.1 per mille; pH, 7.99 to 8.39; phosphate, 3 to 123 mg PO4/m<sup>3</sup>.

<u>Ceratium teres</u> does not avoid oligotrophic water. Forty-seven of the 106 records of occurrence were in

water containing less than 10 mg PO<sub>4</sub>/m<sup>3</sup>.

Nielsen (1934) found this species only in the samples taken from 50 to 0 meters. In the <u>Carnegie</u> collection it was found about as frequently in the 100-meter samples as in the samples from higher levels (table 12). The surface contamination of the deeper nets, however, must be taken into consideration here.

Table 12. Records of occurrence of C. teres at three levels

| Occur-             | Depth in meters |            |         |             |         |            |  |
|--------------------|-----------------|------------|---------|-------------|---------|------------|--|
| rence              | 0               |            | 50      |             | 100     |            |  |
|                    | A               | В          | A       | В           | A       | В          |  |
| Rare<br>Occasional | 36<br>10        | 9.1<br>2.6 | 31<br>3 | 11.0<br>1.1 | 18<br>8 | 7.1<br>3.2 |  |
| Total              | 46              | 11.7       | 34      | 12.1        | 26      | 10.3       |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

12. Ceratium kofoidii Jörgensen Figure 11H, chart 12, appendix table 12

This is a very rare, slightly tolerant tropical species, seldom collected because of its extremely small size. In the <u>Carnegie</u> collection it was found at eight stations in the <u>Pacific</u>. There were twelve records of occurrence, ten of which were rare and two occasional. It was found predominantly in the pump samples because of the smaller mesh of the pump filter net. Two of the records were from net samples and ten were from pump samples.

The record stations for <u>C. kofoidii</u> were widely scattered (chart 12). The surface temperatures at the stations where it occurred, varied from 16.2 to 27.7 C. The environmental conditions in situ were: temperature, 11.7 to 27.6 C; salinity, 34.4 to 35.3 per mille; pH, 8.03

to 8.34; phosphate, 5 to 58 mg  $PO_4/m^3$ .

Six of the records were from surface samples, three from 50-meter samples, and three from the 100-meter samples. Thus, it is probably a surface species. Four of the twelve records were from water containing less than 10 mg  $PO_4/m^3$ .

## 13. Ceratium böhmii n. sp. Figure 12, appendix table 13

Dimensions: diameter, <u>d</u>, 20.5 (18-24) microns. This species is closely related to <u>C. kofoidii</u> with which Böhm (1931, figs. 9C, E, and F) confused it. The dimensions are about the same. The body, however, is much more elongated and the horns, particularly the antapicals, are much longer. The length of the hypotheca from the base of the right antapical horn to the posterior edge of the girdle is more than 0.5 <u>d</u>, whereas in <u>C. kofoidii</u> this length is less than 0.5 <u>d</u>. The right antapical diverges laterally only slightly or not at all.

<u>Ceratium böhmii</u> is a tropical Pacific species, probably slightly tolerant, although this cannot be determined at present because of the paucity of records for the species. It was found at six stations widely scattered as follows: two between Ecuador and the Galapagos, two north of the Phoenix Islands, and two off Japan. There were twelve records of occurrence—eight rare and four occasional. The species was collected more frequently with the pump, probably because of its small size. There were three net records and nine pump records.

The surface temperatures at the stations where the species was found, varied from 18.°7 to 27.°9 C. The environmental conditions in situ were: temperature, 13.°9 to 27.°9 C; salinity, 33.7 to 35.3 per mille; pH, 7.85 to 8.22; phosphate, 4 to 161 mg PO4/m³.

Ceratium böhmii is probably a surface species, although there are not sufficient records to establish this. Five of the records were from surface samples, three were from 50-meter samples, and four from 100-meter samples.

## 14. Ceratium lineatum (Ehrenberg) Cleve Figures 11E-G, chart 12, appendix table 14

Ceratium lineatum is a rare species which is difficult to classify geographically. It occurs in the cold North Atlantic region and at three stations in the warm Atlantic (chart 12). In the Pacific it occurred only off Japan (stations 115a to 117). It is possibly a subpolar species. Peters (1934) found it in the South Atlantic, mostly in the cooler waters. At Carnegie Atlantic stations the species was found mostly in colder waters with surface temperatures from 10.9 to 15.5 C except at stations 17 and 19. At the Pacific record stations the surface temperatures varied from 15.9 to 16.1 C. The environmental conditions in situ were: temperature, 6.7 to 21.2 C; salinity: 33.8 to 37.0 per mille; pH, 7.98 to 8.34; phosphate, 3 to 99 mg PO4/m³.

The total number of station records wasten, of which seven were in the Atlantic and three in the Pacific. There were twenty-six records of occurrence, ten of which were rare, fourteen occasional, and two common. The records of common were from off Japan. Twenty-one of the records were from net samples and five were from pump samples. The species was found frequently at the surface, with thirteen records for the surface, six records for 50 meters, and seven recrods for 100 meters.

The authors were unable to separate <u>C. minutum</u> Jörgensen from <u>C. lineatum</u>. Jörgensen (1920) distinguished <u>C. minutum</u> from <u>C. lineatum</u> by its smaller dimensions, less robust theca, comparatively shorter and broader body, shorter antapical horns, and relatively shorter right antapical horn. <u>Carnegie</u> specimens with the shape of <u>C. minu-</u>

tum have relatively thick walls (fig. 11F); specimens with the typical shape of <u>C. lineatum</u> are in the size range of <u>C. minutum</u>, i.e., transdiameter 25 to 28 microns (figs. 11E, G).

## 15. Ceratium setaceum Jörgensen Figure 11A, appendix table 15

This is a very rare, slightly tolerant tropical species. Nielsen (1934), who first reported it from the Pacific, found it at only two stations -- one north of Samoa, and the other west of New Zealand. In the Carnegie collection it was found at only two stations also--station 70. off Peru, and station 110, between Guam and Japan. Judging from the scattered nature of these records, it is probable that C. setaceum is a widespread tropical species, but occurs in such sparse numbers that it is seldom collected. Another reason for its reported scarcity is undoubtedly its small size which enables it to pass through many nets. This is demonstrated by the fact that all the Carnegie records were from the pump samples which were collected by a much finer (no. 20) cloth than the tow nets. The records were at 0 and 50 meters at station 70, and 100 meters at station 110.

The surface temperatures at the above two stations were 21.2 and 23.9 C. The ranges of environmental conditions in situ were: temperature, 15.4 to 21.2 C; salinity, 34.7 to 35.1 per mille; pH, 7.88 to 8.14; phosphate, 11 to 178 mg  $PO4/m^3$ .

#### Subgenus AMPHICERATIUM

#### 16. Ceratium geniculatum (Lemmermann) Cleve Figure 11]

This is a very rare tropical species. Only one specimen was found in the <u>Carnegie</u> collection, and this was partially broken (fig. 11]). It occurred in the 50-meter pump sample at station 45, latitude 4.5 south, longitude 105° west. The temperature was 22.4 C; salinity, 35.2 per mille; pH, 8.13; and phosphate, 46 mg PO4/m<sup>3</sup>.

#### 17. Ceratium bigelowii Kofoid Figures 11 I, K-M, chart 13, appendix table 16

This is a very rare intolerant tropical species, apparently confined to the Pacific and Indian oceans. It has never been reported from the Atlantic. It was reported from the Pacific by Kofold (1907a) and Nielsen (1934) and from the Pacific and Indian oceans by Böhm (1931). Nielsen found it at four stations in the South Equatorial Current. The Carnegle records contribute considerably to our knowledge of the distribution of this species in the Pacific. They show that it is not restricted to any particular current system, but is distributed over the warm tropical waters in both hemispheres. In the Carnegie collection it was found at twenty-four stations (chart 13). These are distributed in the southeastern Pacific to latitude 34° south (station 57), in the northwestern Pacific to latitude 23.5 north, and in the northeastern Pacific to 26° north latitude. There are forty records of occurrence--thirty-six rare and four occasional. The records of occasional were at 50 meters at stations 95, 96, and 159, and also at the surface at the last station. All three

of these stations were in the region north of Samoa, and it is possible that this is a region usually rich in this species since one of these stations, station 159, was occupied seven months after the other two.

All the records of C. bigelowii are from warm water and are remote from land. The surface temperatures at the stations where it was found, varied from 20.7 to 29.4 C, except at station 57 south of Easter Island where the surface temperature was 19.0. The environmental conditions in situ were: temperature, 14.3 to 29.3 C: salinity, 34.2 to 36.4 per mille; pH, 8.10 to 8.39; phosphate, 3 to 50 mg  $PO4/m^3$ .

According to Nielsen's theory (1934), C. bigelowii should be a shade species since it has an expanded flattened body. Since there have been so few records of this species, however, it has not been possible to examine this feature heretofore. The Carnegie records in this connection are not conclusive. The records of rare and the total number of records for the three levels show an increase in frequency with increase in depth (table 13). The records of occasional, however, stand in opposition to this, with the greatest frequency at 50 meters. Whether C. bigelowii is a shade species cannot be decided definitely until more records of its occurrence have been accumulated.

Since it is a large species, it was collected more often in the net, with thirty-four net records, and only three pump records.

Table 13. Records of occurrence of C. bigelowii at three levels

| Occur-     | Depth in meters |     |    |     |     |      |
|------------|-----------------|-----|----|-----|-----|------|
|            | 0               |     | 50 |     | 100 |      |
| rence      | A               | В   | A  | В   | A   | В    |
| Rare       | 9               | 2.1 | 13 | 3.9 | 14  | 5.5  |
| Occasional | 1               | 0.3 | 3  | 1.0 | 0   | •••• |
| Total      | 10              | 2.4 | 16 | 4.9 | 14  | 5.5  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

18. Ceratium inflatum (Kofoid) Jörgensen Figures 110-S, chart 14, appendix table 17

This species is very closely related to the two following. Jörgensen (1920) considered C. inflatum (Kof.) Jörgensen, C. longirostrum Gourret, C. falcatum Kofoid, and C. falcatiforme Jörgensen all separate species, whereas Peters (1934) treated them as members of a Formenkreis with subspecific rank. Nielsen (1934) considered them distinct. Whatever the taxonomic value of these groups, there is certainly an intergradation between them. In this report the first three have been kept separate, but this arrangement must be considered tentative until more statistical work is done on the group. It was found impossible, however, to separate C.falcatiforme from C. falcatum. Therefore, only the first three species are listed in this report.

One of the characters which Jörgensen (1920) used for the differentiation of the above species was length of epitheca relative to length of hypotheca -- the ep/hyp ratio. For each species he gave the mean, minimum, and maximum ep/hyp ratios. It should be noted that his fractions for maxima represent the maximum length of epitheca over the maximum length of hypotheca and not the maximum ep/hyp ratios that follow them, which might be inferred

from his method of presentation. The same holds true for his minima. Unfortunately, many of Jörgensen's figures for this group indicate ratios which are beyond the range that he states in the text. For instance, his figures of C. longirostrum (figs. 26 and 27) show ep/hyp ratios of 1.525 and 1.55, whereas in the description he states that the maximum ratio is 1.45. Which is correct. the figures or the description? Owing to these inaccuracies it is difficult to evaluate Jörgensen's data.

A study of the Carnegie specimens, however, resulted in measurements showing fairly close agreement with those of Jörgensen. For C. inflatum he gave an ep/hyp ratio of 1.15 (1.06 to 1.26) for an  $\alpha$  form and 1.21 (1.18 to 1.23) for "another form." This ratio in the present material was 1.11 (0.86 to 1.25). Equally close agreement was found in the case of the other species The total length in our material is 1010 (which see). microns (640 to 1460); the diameter 40 microns (30 to 80). Incidentally, C. inflatum in our material is easily separated from C. longirostrum by its diameter alone, since the latter has a diameter of 19 microns (15 to 27).

It must also be noted that C. bigelowii is closely related to C. inflatum and should be included in the group in case it is treated as a Formenkreis. In the Carnegie material quite wide specimens of C. inflatum were found which were difficult to separate from C. bigelowii. This was particularly true where there was a lateral flattening of the body (fig. 11R).

Ceratium inflatum is a rare, intolerant tropical species confined entirely to warm water. In the Carnegie collection it occurred at twenty-four stations--five in the Atlantic and nineteen in the Pacific. There were thirtyone records of occurrence, thirty of which were rare and one occasional. Twenty-five were from net samples and six were from pump samples.

The record stations for this species were scattered over the warm-water regions. All of them were remote from land, except one near Panama. The surface temperatures at these stations were from 26.0 to 27.2 in the Atlantic, and from 22.3 to 28.0C in the Pacific, except at one station south of Easter Island where the temperature was 19° C. The environmental conditions in situ were: temperature, 16.6 to 28.6 C; salinity, 34.3 to 36.8 per mille; pH, 8.00 to 8.37; phosphate, 3 to 121 mg PO4/m3.

Ceratium inflatum is apparently an oligotrophic species. Not only was it found principally in warm water remote from land, but it was usually found in water of low nutrient content. More than half (seventeen) of the twenty-nine records of its occurrence were in water containing less than 10 mg PO4/m3.

Nielsen (1934) suggested that this was a surface species although also found in the deeper samples. Carnegie collection it had its maximum frequency at 50 meters (see table 14). Thus, the data acquired so far indicate that the occurrence of C. inflatum is rather general in a vertical direction.

Table 14. Records of occurrence of C. inflatum at three levels

| Occur-             | Depth in meters |      |         |            |        |     |  |
|--------------------|-----------------|------|---------|------------|--------|-----|--|
| rence              |                 | 0 50 |         | 100        |        |     |  |
| 101100             | A               | В    | A       | В          | A      | В   |  |
| Rare<br>Occasional | 12<br>0         | 2.9  | 11<br>1 | 3.9<br>0.4 | 7<br>0 | 2.4 |  |
| Total              | 12              | 2.9  | 12      | 4.3        | 7      | 2.4 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

19. Ceratium longirostrum Gourret Figures 11T-V, chart 14, appendix table 18

Total length, 644 (570-730) microns; diameter, 19 (15-27) microns; ep/hyp ratio, 1.36 (1.19-1.50). Jörgensen (1920) gave the ep/hyp ratio as 1.38 (1.26-1.45). Thus, there is close agreement between the world material of the <u>Carnegie</u> and the Mediterranean material of Jörgensen.

Ceratium longirostrum is a rare, intolerant tropical species with a distribution similar to that of <u>C. inflatum</u> (see chart 14). In the <u>Carnegie</u> collection it was found at sixteen stations—two in the Atlantic and fourteen in the Pacific. There were twenty—six records of occurrence—twenty—one rare and five occasional. Eighteen records were from net samples and eight were from pump samples.

The surface temperatures at the stations where it occurred, varied from 22.3 to 29.3 C, except at one station (station 2) in the North Atlantic Drift where the temperature was 20.5 C. The environmental conditions in situ were: temperature, 21.6 to 28.5 C; salinity, 34.4 to 36.6 per mille; pH, 8.14 to 8.37; phosphate, 5 to 36 mg PO4/m<sup>3</sup>.

Not only is <u>C. longirostrum</u> found in warm water remote from land, but it is often in water poor in nutrients. Fourteen of the twenty-six records of occurrence were in water containing less than 10 mg PO<sub>4</sub>/m<sup>3</sup>.

Nielsen (1934) listed <u>C. longirostrum</u> as a surface species. In the <u>Carnegie</u> collection there were insufficient records to draw any conclusions in this regard. It was found least often at 50 meters, but more frequently at 100 meters than at the surface (table 15).

Table 15. Records of occurrence of C. longirostrum at three levels

| Occur-             |         |            | Depth | Depth in meters |   |            |  |
|--------------------|---------|------------|-------|-----------------|---|------------|--|
| rence              |         | 0          |       | 50              |   | 100        |  |
| Tence              | A       | В          | A     | В               | A | В          |  |
| Rare<br>Occasional | 10<br>2 | 2.6<br>0.5 | 3 2   | 1.1             | 8 | 3.1<br>0.4 |  |
| Total              | 12      | 3.1        | 5     | 1.8             | 9 | 3.5        |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

20. Ceratium falcatum (Kofoid) Jörgensen Figures 11W-AA, chart 15, appendix table 19

Total length, 513 (350-750) microns; diameter, 23 (15-35) microns; ep/hyp ratio, 1.38 (1.00-0.72). Jörgensen (1920) gave the ep/hyp ratios for C. falcatum as 1.56 (1.38-1.70) and for C. falcatiforme, 1.13 to 1.20. The Carnegie range thus includes both of these. It was impossible to separate in the Carnegie material a small form answering to C. falcatiforme Jörgensen. Jörgensen stated that the length of this form was about 280 microns which is smaller than any Carnegie specimen measured. Many specimens were found, however, which had the shape of the species in question, although larger than this. These intergraded into the typical C. falcatum (figs. 11W-AA). It is probable that C. falcatiforme is simply an extreme of the species C. falcatum. Nielsen (1934) considered it a well-defined species, but presented no

measurements, ratios, or other evidence which might indicate that it is distinct in the Pacific. He simply stated that it is "small."

<u>Ceratium falcatum</u> is a rare, intolerant tropical species with a distribution similar to that of <u>C. inflatum</u> and <u>C. longirostrum</u> (see chart 15). In the <u>Carnegie</u> collection it was found at thirty stations—one in the Atlantic and twenty—nine in the Pacific. There were forty—seven records of occurrence—forty—six rare and one occasional. Thirty—four records were from net sam—ples and thirteen were from pump samples.

The surface temperatures at the stations where it occurred, varied from 19.0 to 28.4 C. The environmental conditions in situ were: temperature, 14.2 to 28.5 C; salinity, 34.5 to 36.4 per mille; pH, 7.86 to 8.39; phosphate, 4 to 198 mg PO<sub>4</sub>/m<sup>3</sup>.

Although this species was found mostly in oligotrophic water, this was not so evident as in the case of  $\underline{C.\ inflatum}$  and  $\underline{C.\ longirostrum}$ . Only ten of the forty-seven records were in water containing less than 10 mg  $PO4/m^3$ .

Nielsen (1934) listed <u>C. falcatum</u> and <u>C. falcatiforme</u> as surface species. This is borne out by the <u>Carnegie</u> data (see table 16).

Table 16. Records of occurrence of C. falcatum at three levels

| Occur-             | Depth in meters |            |         |     |         |     |  |
|--------------------|-----------------|------------|---------|-----|---------|-----|--|
| rence              |                 | 0          |         | 50  |         | 0   |  |
| Tence              | A               | В          | A       | В   | A       | В   |  |
| Rare<br>Occasional | 26<br>1         | 5.7<br>0.3 | 10<br>0 | 2.8 | 10<br>0 | 3.9 |  |
| Total              | 27              | 6.0        | 10      | 2.8 | 10      | 3.9 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

21. Ceratium extensum (Gourret) Cleve Figures 11BB-DD, chart 16, appendix table 20

This species includes <u>C. strictum</u> (Okamura and Nishikawa) Kofoid, which is characterized by the presence of a well-formed right antapical horn. Since the presence of this horn is not a reliable character, and since it is the only one separating <u>C. strictum</u> from <u>C. extensum</u>, it is no longer considered a separate species (see Jörgensen, 1920; Peters, 1934; and Nielsen, 1934).

The species is a widespread very tolerant tropical form. In the <u>Carnegie</u> collection it occurred at 104 stations--14 in the Atlantic and 90 in the Pacific. These were distributed in the various regions as follows: 3 in the cold North Atlantic (in the North Atlantic Drift), 11 in the warm Atlantic, 1 in the cold North Pacific (off California), 79 in the warm Pacific, and 10 in the southeast Pacific. There were 234 records of occurrence--136 rare, 81 occasional, and 17 common. Of the total number, 144 were from net samples and 90 were from pump samples.

The surface temperatures at the stations where it occurred, varied from 12.4 to 29.4 C. In the northeastern Pacific and in the southeastern Pacific it extended into water with surface temperatures of 16.4 and 14.97 respectively. In the North Atlantic Drift it extended close

to the British Isles to a surface temperature of 12.4 C. The environmental conditions in situ varied as follows: temperature, 10.4 to 29.4 C; salinity, 29.7 to 37.1 per mille; pH, 8.0 to 8.39; phosphate, 2 to 99 mg PO<sub>4</sub>/m<sup>3</sup>.

Nielsen (1934) classified <u>C. extensum</u> as a surface species. The <u>Carnegie</u> data corroborate this classification. The species was found with decreasing frequency with increase in depth (see table 17). If due correction were made for contamination of the open nets, this feature would be more pronounced.

Table 17. Records of occurrence of C. extensum at three levels

| Occur-                       |               |                     | Depth in meters |                    |               |                    |  |
|------------------------------|---------------|---------------------|-----------------|--------------------|---------------|--------------------|--|
| rence                        | (             | 0                   |                 | 50                 |               | 00                 |  |
| T CHCC                       | A             | В                   | A               | В                  | A             | В                  |  |
| Rare<br>Occasional<br>Common | 72<br>43<br>9 | 18.7<br>11.2<br>2.3 | 33<br>28<br>6   | 11.7<br>9.9<br>2.1 | 30<br>10<br>2 | 11.8<br>3.9<br>0.8 |  |
| Total                        | 124           | 32.2                | 67              | 23.7               | 42            | 16.5               |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

22. Ceratium fusus (Ehrenberg) Dujardin Figures 11EE, 13A-D, chart 17, appendix table 21

Ceratium fusus is a widespread cosmopolitan species. It may be composed of subspecies but so far no morphological differences warranting a division of the species have been found. Jörgensen (1920) believed that he could distinguish a tropical subspecies (seta [Ehrenberg]) from the northern form of the species, but later workers have not been able to verify this (Peters, 1934; Nielsen, 1934). Peters found several different forms in different parts of the South Atlantic, but they intergraded so much that he was not able to separate them satisfactorily. Nielsen considered the species to represent a single genotype which is definitely modified as to size by ecological conditions. His data for the South Pacific show an increase in size under neritic conditions.

In the <u>Carnegie</u> collection a statistical difference was found between the forms growing in the different life zones (see table 18). It is evident from these data thatt the specimens from cold-water regions have a distinctly greater diameter than those from the warm-water regions as shown by both the means and extremes. The length, however, does not show the same correlation. The specimens from the warm Atlantic showed the greatest average length, whereas those from the warm Pacific had the smallest. It is to be hoped that a finer morphological analysis of this species will throw some light on the taxonomic-ecologic problems involved.

In the <u>Carnegie</u> collection <u>C. fusus</u> was found at ninety-four stations—twenty—five in the Atlantic, and sixty—nine in the Pacific. These stations were distributed from the warmest to the coldest regions visited (see chart 17). There are particular lines of stations, however, where <u>C. fusus</u> was not found. These distributional gaps cannot be explained on the basis of general rarity of the species. In the <u>Carnegie</u> collection there were 194 records of its occurrence. Of these, 109 were rare, 67 occasional, 11 common, and 7 abundant. Most of the records of higher frequency, however, were from the cold Atlantic region.

Table 18. Size variation in Ceratium fusus

| Region     | Total length in microns | Diameter in microns |  |  |
|------------|-------------------------|---------------------|--|--|
| Cold       |                         |                     |  |  |
| Atlantic   | 410 (310-500)           | 21.6 (20-28)        |  |  |
| Warm       |                         | ` ′                 |  |  |
| Atlantic   | 459 (345-434)           | 20 (16-25)          |  |  |
| Cold North |                         |                     |  |  |
| Pacific    | 420 (330-520)           | 24 (20-32)          |  |  |
| Warm       |                         |                     |  |  |
| Pacific    | 329 (168-422)           | 15 (10-25)          |  |  |
| Southeast  |                         |                     |  |  |
| Pacific    | 345 (250-405)           | 17 (12-22)          |  |  |

and it should be noted that the lines of stations where the species was not found are mostly in regions of low phosphate content. Only 23 of the 194 records of occurrence were in water containing less than 10 mg PO4/m3. Thus, it is possible that C. fusus does not normally develop to any great extent in oligotrophic water.

Since the species is cosmopolitan, it was found in a great range of conditions. The surface temperatures at the stations where it occurred, varied from 7.2 to 29.5 C. The environmental conditions in situ were: temperature, 2.1 to 29.5 C; salinity, 32.7 to 37.0 per mille; pH, 7.71 to 8.37; phosphate, 4 to 209 mg PO4/m3.

The very narrow body of <u>C. fusus</u> permits it to escape from the larger meshed nets. Consequently there are relatively more pump records for the species than net records. It was found in only 18 per cent of the net samples, but in 26 per cent of the pump samples.

Nielsen (1934) classified <u>C. fusus</u> as a surface species. This classification is probably correct. In the <u>Carnegie</u> collection the number of records decreased with increase in depth (see table 19). After correcting for upper-level contamination in the open nets, it is obvious that the species is much more frequent in the surface layer.

Table 19. Records of occurrence of C. fusus at three levels

| Occur-<br>rence      | Depth in meters |                    |                |              |        |            |  |  |
|----------------------|-----------------|--------------------|----------------|--------------|--------|------------|--|--|
|                      | 0               |                    | 50             |              | 100    |            |  |  |
|                      | A               | В                  | Α              | В            | A      | В          |  |  |
| Rare                 | 44              | 10.9               | 34             | 12.0         | 31     | 12.2       |  |  |
| Occasional<br>Common | 37<br>8         | 9.4<br><b>2.</b> 8 | $\frac{21}{1}$ | $7.5 \\ 0.4$ | 9<br>2 | 3.5<br>0.7 |  |  |
| Abundant             | 4               | 1.4                | 2              | 0.8          | 1      | 0.4        |  |  |
| Total                | 93              | 24.5               | 58             | 21.7         | 43     | 16.8       |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

#### Subgenus EUCERATIUM

#### 23. Ceratium tripos (O. F. Müller) Nitzsch

No species of the genus is so complex and variable as <u>C. tripos</u>. For a time there was a tendency to separate the components of this form into separate units with specific rank. This movement was led by Jörgensen

(1911, 1920). Later a tendency developed to lump these units into a Formenkreis or a few species. Peters (1934) included under C. tripos all the varieties of pulchellum (see Jörgensen, 1920). He divided the species into three subspecies: atlanticum, pulchellum, and semipulchellum. Nielsen (1934), on the other hand, recognized four separate species in this group as follows: C. tripodoides, C. semipulchellum, C. pulchellum, and C. tripos. He separated the first three species from each other on the basis of statistical studies of individual plankton samples. He found a grouping according to diameter and "antapi-cal length." The last, <u>C. tripos</u>, which he found only in the cold water in the region of Australia and New Zealand, he considered distinct because of its shorter apical horn and stronger antapicals. These characters can hardly be sufficient for the separation of a species in this variable group. It is probable that the New Zealand-Australian form is simply a southern subspecies or race. Certainly Nielsen's drawings (figs. 32 and 33) do not show sufficient distinctness for a separation from his C. semipulchellum (fig. 30).

The present authors lean toward the view of Peters (1934) in regard to this group, with the exception that <u>C.</u> pulchellum (eupulchellum of Jörgensen) has been treated as a separate species. Considering the collection as a whole, there was very little intergradation between this form and <u>semipulchellum</u>. Between <u>semipulchellum</u> and <u>tripos</u>, on the contrary, there are many intergradations, i.e., in various characters such as size, spread of horns, and antapical curvature. It was considered advisable for the present to treat these two units as subspecies. They, in turn, are each composed of an endless number of varieties or races, which, however, are not recorded here as they are impossible to separate with our present knowledge of morphological characters in this genus.

Ceratium tripos subsp. atlanticum (Ostenfeld) Figures 13E-K, chart 18, appendix table 22

This subspecies is more characteristic of colder waters although it is sometimes found in the tropics; The tropical forms are probably separate races; some of them vary toward the <u>semipulchellum</u> form.

In the <u>Carnegie</u> collection subsp. <u>atlanticum</u> was found throughout the cold Atlantic region and at ten stations in the warm Atlantic region. In the Pacific it was found in the cold North Pacific region to the west and east but not in the most northern part. In the warm Pacific region it was found at ten stations north of 27° north latitude, and at two stations in the southeastern part. In the southeast Pacific region it was found at thirteen stations. The total number of record stations for the subspecies was sixty-one--twenty-six of which were in the Atlantic and thirty-five in the Pacific.

It was not found so often as subsp. semipulchellum but a high percentage of the records were above "rare." The total number of occurrences was 163, of which 49 were rare, 61 occasional, 45 common, and 8 abundant.

Since the subspecies is cosmopolitan, the range of environmental conditions was great. It was not, however, found at the warmest stations of the Pacific. The range of surface temperatures at the record stations in the Atlantic was from 8.9 to 28.5 C; in the Pacific from 6.9 to 27.1 C. The environmental conditions in situ were: temperature, 6.1 to 28.2 C; salinity, 31.7 to 36.4 per mille; pH, 7.80 to 8.37; phosphate, 2 to 181 mg PO4/m3.

This subspecies, like the rest of the Formenkreis, is a surface species, although it is also found in considerable numbers in the deeper levels. As shown in table 20, subsp. atlanticum was found most frequently in the surface samples.

Table 20. Records of occurrence of C. tripos subsp. atlanticum at three levels

| Occur-<br>rence                          | Depth in meters     |                          |                     |                          |                    |                   |  |  |
|--|---------------------|--------------------------|---------------------|--------------------------|--------------------|-------------------|--|--|
|  | 0                   |                          | 50                  |                          | 100                |                   |  |  |
|  | A                   | В                        | A                   | В                        | A                  | В                 |  |  |
| Rare<br>Occasional<br>Common<br>Abundant | 22<br>32<br>25<br>7 | 5.7<br>8.3<br>6.5<br>1.8 | 14<br>13<br>11<br>1 | 4.6<br>4.6<br>3.9<br>0.4 | 13<br>16<br>9<br>0 | 5.1<br>6.3<br>3.5 |  |  |
| Total                                    | 86                  | 22.3                     | 39                  | 13.5                     | 38                 | 14.9              |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

Ceratium tripos subsp. semipulchellum (Jörgensen) Figures 13L-N, chart 19, appendix table 23

This subspecies is a slightly tolerant tropical form which occurs almost continuously in the warm regions and the southeast Pacific region (chart 19). It is limited to the tropical waters except in the southeastern Pacific and northeast of Japan. In the Atlantic it was limited entirely to the warm Atlantic region. In the Pacific it occurred at one station northeast of Japan in the cold North Pacific region, although not in water of low temperature; the lowest surface temperature being 16.1 C. In the southeastern Pacific region it was found at all but three stations. The surface temperatures at the record stations there were as low as 15° C. The total range of surface temperatures was from 15° to 29.5 C. ranges of environmental conditions in situ were: temperature, 11.4 to 29.4 C; salinity, 31.6 to 36.6 per mille; pH, 7.76 to 8.47; phosphate, 2 to 198 mg PO<sub>4</sub>/m<sup>3</sup>.

The subspecies was found at a total of 127 stations—21 in the Atlantic and 106 in the Pacific. It is one of the most common of the Ceratia. This is shown, not only by the large number of stations at which it was found, but also by the large number of single records of occurrence and relative abundance. There were 391 records of occurrence, with 161 rare, 156 occasional, 72 common, and 2 abundant. Since it is a large form, it was found more often in the net samples. There were 256 net records and 135 pump records.

The subspecies definitely does not avoid oligotrophic water, as its record stations are unbroken through regions of poor water, and 140 of the 391 records of occurrence were in water containing less than 10 mg PO<sub>4</sub>/m<sup>3</sup>.

In regard to depth, Melsen (1934) states that <u>semi-</u>pulchellum is a definite surface form. The <u>Carnegie</u> data, on the contrary, indicate that it lives throughout the upper 100-meter layer. The greatest percentage of "rare" records was at 100 meters (see table 21); of "occasional" records at the surface; of "common" records at 50 meters; and the greatest total percentage was at 50 meters. The large number of records for the 50- and 100-meter levels cannot be explained entirely on the basis of contamination of the open nets since there were twenty-three stations scattered over the Atlantic and

Pacific where the subspecies was not recorded for the surface but was recorded for either or both the 50- and 100-meter levels.

Table 21. Records of occurrence of C. tripos subsp. semipulchellum at three levels.

| Occur-     |     | Depth in meters |     |      |     |      |  |  |  |
|------------|-----|-----------------|-----|------|-----|------|--|--|--|
| rence      |     | 0               |     | 50   |     | 00   |  |  |  |
|            | A   | В               | A   | В    | A   | В    |  |  |  |
| Rare       | 60  | 15.6            | 46  | 16.0 | 55  | 21.6 |  |  |  |
| Occasional | 72  | 18.7            | 47  | 16.6 | 37  | 14.6 |  |  |  |
| Common     | 28  | 7.2             | 31  | 11.0 | 13  | 5.1  |  |  |  |
| Abundant   | 1   | 0.2             | 1   | 0.3  | 0   |      |  |  |  |
| Total      | 161 | 41.7            | 125 | 43.9 | 105 | 41.3 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

24. Ceratium pulchellum Schröder (=C. pulchellum f. eupulchellum Jörgensen) Figures 14B-F, chart 20, appendix table 24

As stated above (p. 26), <u>C. pulchellum</u> Schröder is considered distinct from the <u>C. tripos-C. semipulchell-lum</u> complex. It is characterized by short antapical horns and small size. The diameter in our material was 46 (22-60) microns.

Ceratium pulchellum is a fairly common, slightly tolerant tropical species. In the Carnegie collection it was found at sixty-nine stations--eleven in the Atlantic and fifty-eight in the Pacific. In the Atlantic the stations were restricted to the warm Atlantic region; in the Pacific they were scattered over the warm Pacific region and the southern part of the southeast Pacific region. The total number of sample records for the species was 158, of which 97 were rare, 47 occasional, and 14 common. It is a curious fact that the relative number of pump records for the species is greater than the net samples. The species was found in 15 per cent (82) of the net samples and 21 per cent (76) of the pump samples. This probably is owing to the relatively small diameter of the species and to the short antapical horns, which permit the species to pass more readily through the coarser cloth of the tow net.

The surface temperatures at the stations where the species was found, varied from 16.9 (in the southeastern Pacific) to 29.5 C (north of Samoa). The environmental conditions in situ were: temperature, 11.4 to 29.4 C;

Table 22. Records of occurrence of C. pulchellum at three levels

| Occur-<br>rence |    | Depth in meters |    |      |     |      |  |  |  |
|-----------------|----|-----------------|----|------|-----|------|--|--|--|
|                 | 0  |                 | 50 |      | 100 |      |  |  |  |
|                 | A  | В               | A  | В    | A   | В    |  |  |  |
| Rare            | 47 | 12.2            | 27 | 9.5  | 23  | 9.1  |  |  |  |
| Occasional      | 32 | 8.3             | 9  | 3.2  | 6   | 2.4  |  |  |  |
| Common          | 9  | 2.3             | 3  | 1.1  | 2   | 8.0  |  |  |  |
| Total           | 88 | 22.8            | 39 | 13.8 | 31  | 12.3 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

salinity, 34.0 to 37.1 per mille; pH, 7.76 to 8.39; phosphate, 3 to 123 mg  $PO4/m^3$ .

Ceratium pulchellum is decidedly a surface species as can be seen from table 22.

## 25. Ceratium humile Jörgensen Figure 14A

This species was reported from Japanese waters by Jörgensen (1911), and from the Australian region by Nielsen (1934). The latter author considered it endemic in the East-Asiatic Australian region. He also considered it a purely neritic species. For this reason, the single record of this species in the <u>Carnegie</u> collection is remarkable. It was found in the surface sample at station 1 in the Gulf Stream. This not only extends the known distribution of the species to another ocean but indicates that, at least in the Atlantic, it is not necessarily a neritic species. The surface temperature at this station was 24.0 C. The specimen (fig. 14A) resembles those figured by Jörgensen (1911, figs. 82 and 83) somewhat more than that figured by Nielsen (1934, fig. 34) as the right horn is more ascending.

#### Ceratium breve (Ostenfeld and Schmidt) Schröder Figures 14G-P, chart 21, appendix table 25

This is a variable species which exhibits transitions to many other species of the genus, namely, C. schmidtii, C. tripos, and C. arcuatum. Peters (1934) has suggested that it be included in the Formenkreis C. tripos. Bohm stressed the similarity between C. breve and C. arcuatum Cleve and the present authors believe that C. schmidtii likewise is similar or identical to C. breve. A series of specimens is shown in figures 14G to P which extends from the form with short, curved antapicals as in C. schmidtii (fig. 141) to the open parallelum type simulating C. arcuatum (fig. 14K). It is probable, as Böhm (1931) stated, that the transition to C. arcuatum is superficial rather than genetic. Whether C. schmidtii should be included in C. breve is more difficult to say. According to Jörgensen (1911) the body of C. schmidtii is concave so the antapical horns have a ventral curvature. This feature, however, is sometimes found in C. breve, so it is not possible to separate these two forms on that basis.

Ceratium breve is an intolerant tropical species. In the Carnegie collection it was found at ninety-two stations -eighteen in the Atlantic and seventy-four in the Pacific. All the Atlantic stations were in the warm Atlantic region. The Pacific stations were in the warm Pacific region or the western part of the southeast Pacific region, with the single exception of station 70 off Peru. The surface temperature there, however, was high, namely, 21.2C. The species was not found in most of the southeastern Pacific nor in most of the area between California and Hawaii. This distribution may represent the effects of subpolar currents (see p. 9). The complete range of surface temperatures was 18.7 to 29.5 C. The environmental conditions in situ were: temperature, 12°5 to 29°4 C; salinity, 29.7 to 36.8 per mille; pH, 7.68 to 8.47; phosphate, 2 to 189 mg PO4/m3.

Nielsen (1934) classified <u>C. breve</u> as a surface form. The <u>Carnegie</u> data corroborate this classification. As shown in table 23, it was found less frequently in the deeper samples. If due correction were made for the

contamination of the open nets this tendency would be more pronounced.

Table 23. Records of occurrence of C. breve at three levels

| Occur-<br>rence |     | Depth in meters |    |      |    |      |  |  |  |
|-----------------|-----|-----------------|----|------|----|------|--|--|--|
|                 |     | 0               |    | 50   |    | 00   |  |  |  |
|                 | A   | В               | A  | В    | A  | В    |  |  |  |
| Rare            | 43  | 10.4            | 37 | 13.9 | 32 | 12.0 |  |  |  |
| Occasional      | 55  | 13.3            | 30 | 10.6 | 23 | 8.0  |  |  |  |
| Common          | 23  | 6.0             | 10 | 3.5  | 5  | 2.0  |  |  |  |
| Total           | 121 | 29.7            | 77 | 28.0 | 60 | 22.0 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

The species is often found in comparatively large numbers. There were 258 records of occurrence, of which 112 were rare, 108 occasional, and 38 common. Since it is a large species, it was found more often in the net samples. There were 181 net samples and 77 pump samples. Seventy-five of the records were in water containing less than 10 mg PO4/m3.

## 27. Ceratium compressum Gran Figure 15A

This is a very rare species previously known only from the temperate waters of the North Atlantic. In the <u>Carnegie</u> collection a single specimen was found. This occurred in the 100-meter net sample from station 61 in the southeastern Pacific, latitude 38.°5 south. Probably this is a bipolar species occurring in the cooler waters of both hemispheres. The surface temperature at station 61 was 16.°9 C. The environmental conditions at 100 meters were: temperature, 10.°8 C; salinity, 34.0 per mille; pH, 8.03; phosphate, 80 mg PO4/m³.

### 28. Ceratium euarcuatum Jörgensen Figures 15N-M, chart 22, appendix table 26

This is a distinct and easily recognized species which varies comparatively little. It is an intolerant tropical species, although found almost continuously in the warm regions of the oceans (chart 22). It was found at eighty-five stations--fourteen in the Atlantic, and seventy-one in the Pacific. In the Atlantic it was confined to the warm Atlantic region and in the Pacific to the warm Pacific region except for two stations in the western part of the southeast Pacific region. The surface temperatures at the stations where it occurred in the Atlantic varied from 24.0 to 28.0 C and in the Pacific from 19.0 to 29.5 C. It was absent from the entire southeastern Pacific east of 100° west longitude except for one station west of the Galapagos Islands. Nielsen (1934), however, found a single specimen in the Panama region.

Ceratium euarcuatum probably is one of the best indicators of warm tropical water. It apparently is of no value as an indicator of intrusions of water of tropical origin, however, since it does not seem to extend beyond the tropical boundaries in such currents as the Kuroshio and Gulf Stream. Apparently it does not endure a lowering

of the temperature. On the other hand, it is found within the tropics in regions where cooler water has been brought in from other regions or from vertical disturbances. Thus, it was found west of the Galapagos where the surface temperature was 19.6 and south of Easter Island where it was 19.0 C. Nielsen (1934) found that it was restricted to water where the surface temperatures were above 22.5 C. During the cruise of the Dana the temperatures in the region of the Galapagos were somewhat higher than when the Carnegie visited there but the species was not found in this area by Nielsen. probable that this region is in the line of distributional limit for the species, that normally it does not occur southeast of there, and that its occurrence in the region of the Galapagos depends on the amount of mixing of the waters in that region and on the amount of extrusion of the water of the Humboldt Current. Peters (1934) considered C. euarcuatum an indicator of warm oligotrophic water in the South Atlantic. Nielsen (1934), on the other hand, found it in water rich in nutrients and plankton as well as in oligotrophic water.

One might conclude from the <u>Carnegie</u> distribution of <u>C. euarcuatum</u> in the Atlantic and North Pacific that the species preferred oligotrophic water because its distributional limits in these oceans parallel quite closely the line of 10 mg PO4/m³ (cf. charts 22 and 50). This correlation, however, does not hold in the South Pacific where the species was frequently found in water rich in nutrients. Thus, we must conclude that it is not high concentration of nutrients which is limiting the distribution of the species in the northern waters but some other factor associated with it. Only 86 of the 185 records of occurrence were in water containing less than 10 mg PO4/m³.

Within the tropics the species is fairly common so there were many records of occurrence, namely, 185; of which 97 were rare, 75 occasional, and 13 common. It was found more often in net samples, with 128 net records and 57 pump records.

The environmental conditions in situ were: temperature, 13.6 to 29.3 C; salinity, 33.9 to 37.1 per mille; pH, 7.17 to 8.47; phosphate, 3 to 123 mg PO<sub>4</sub>/m<sup>3</sup>.

Nielsen (1934) classified  $\underline{C}$ . euarcuatum as a shade species and the  $\underline{Carnegie}$  data substantiate this classification. As shown in table 24, it was found more frequently at the lower levels than at the surface.

Table 24. Records of occurrence of C. euarcuatum at three levels

| Occur-<br>rence | Depth in meters |     |    |      |    |      |  |  |  |
|-----------------|-----------------|-----|----|------|----|------|--|--|--|
|                 | 0               |     | 5  | 50   |    | 00   |  |  |  |
|                 | A               | В   | A  | В    | A  | В    |  |  |  |
| Rare            | 22              | 5.7 | 49 | 17.4 | 26 | 12.0 |  |  |  |
| Occasional      | 11              | 2.8 | 43 | 15.3 | 21 | 8.0  |  |  |  |
| Common          | 2               | 0.5 | 5  | 1.7  | 6  | 2.0  |  |  |  |
| Total           | 35              | 9.0 | 97 | 34.4 | 53 | 22.0 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

29. Ceratium filicorne Nielsen Figures 15B-C, chart 23, appendix table 27

This species was described by Nielsen from the  $\underline{Dana}$  collection in the South Pacific. He stated that it is closely related to both  $\underline{C.euarcuatum}$  and  $\underline{C.symmetricum}$ 

and probably has been confused by some with the latter species, although the original figures of Pavillard (1905) and Jörgensen (1911, 1920) were not <u>C. filicorne</u>. In the <u>Carnegie</u> collection this species was identified without any difficulty, and no intergrades were found between it and either C. euarcuatum or C. symmetricum.

Ceratium filicorne has a distribution of particular interest. In the <u>Carnegie</u> collection it occurred only in the South Pacific. This distribution is unique for the Ceratium species. Since the only other records for the species are those of Nielsen (which are also from the South Pacific), its known distribution is limited to that region. Nielsen's records run from the Tuamotu Islands to Fiji. In the <u>Carnegie</u> collection there are three stations for the species between the Tuamotus and Samoa, i.e., in the same general region of those of Nielsen; the other stations, fifteen in number, are in the southeastern Pacific. These, however, are limited to the warm Pacific region, although they include all the stations (4) in the eastern extension of the region.

This is one of the most extraordinary distributions found in the genus. If it were an extremely rare species this distribution would not be remarkable as it might be explained on the basis of incomplete sampling. This probably is not the explanation in this case, however, since the species was not found in particularly small numbers within its range. Of the twenty-seven records of occurrence only six were rare, whereas fourteen were occasional, and seven were common. Fifteen of the records were from net samples and twelve were from pump samples. Why the species is not found in the equatorial regions is an enigma. Is there something peculiar to the South Pacific necessary for the development of C. filicorne?

The surface temperatures at the stations where the species occurred, varied from 19.0 to 28.7 C. The environmental conditions in situ were: temperature, 14.3 to 27.6 C; salinity, 34.4 to 36.3 per mille; pH, 7.17 to 8.27; phosphate, 8 to 32 mg PO4/m<sup>3</sup>.

There was only one record from water withless than 10 mg PO4/m³. Nielsen (1934) designated <u>C. filicorne</u> as a genuine shade species, and this is borne out by the <u>Carnegie</u> data, as can be seen in table 25. It was found predominantly in the 100-meter samples, and only a single specimen was found in the surface samples.

Table 25. Records of occurrence of C. filicorne at three levels

| Occur-     |   | Depth in meters |   |     |    |     |  |  |
|------------|---|-----------------|---|-----|----|-----|--|--|
| rence      | 0 |                 | 5 | 50  |    | 0   |  |  |
|            | A | В               | A | В   | A  | В   |  |  |
| Rare       | 1 | 0.3             | 1 | 0.4 | 4  | 1.3 |  |  |
| Occasional | 0 |                 | 3 | 1.1 | 11 | 4.3 |  |  |
| Common     | 0 | ****            | 1 | 0.4 | 6  | 2.3 |  |  |
| Total      | 1 | 0.3             | 5 | 1.9 | 21 | 7.9 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth

30. Ceratium symmetricum Pavillard Figures 15H-L, chart 24, appendix table 28

Paulsen (1931) suggested that the name <u>C. gracile</u> be supplanted because of the confusion of synonyms and the

differences of opinion of Jörgensen (1911, 1920) and Pavillard (1923). The present authors agree that the name should be dropped, not because of the confusion of these authors' opinions, however, but because the original drawing of Gourret (1883, pl. I, fig. 1) is not identifiable.

There is a considerable difference of opinion as to what segregation of forms should be made within this group. Peters (1934) listed only two forms; C. gracile gracile and C. gracile symmetricum. He included var. orthoceros Jörgensen in his subspecies gracile. It is doubtful, however, if he found coarctatum, since his drawings do not show it. Nielsen (1934), on the basis of some statistical work on size and horn spread, decided that the various forms he found could be lumped into a single unified species. It is doubtful, however, if his measurements of horn spread properly express the difference in body shape and origins of horns--which are the distinguishing features of the segregates of this group. The present authors believe, on the basis of the study of the Carnegie material, that coarctatum and orthoceros are sufficiently distinct to justify the retention of their names and the recording of their distributions. There is sufficient intergradation between them, on the other hand, that they cannot be given more than varietal value. Variety coarctatum is characterized by long, more or less parallel, horns; var. symmetricum by widely spreading horns; var. orthoceros by short close horns, and the right antapical in particular, with an abrupt anterior turn.

The three forms of the species are not subspecies in the geographic sense; they are all found within the same regions. For this reason their records have been combined on the chart (chart 24) although the individual records are noted on the distributional list (appendix table 28).

The species as a whole is a fairly common warmwater form. In the <u>Carnegie</u> collection it was found at eighty-one stations--fifteen in the Atlantic and sixty-six in the Pacific. In the Atlantic these were all in the warm Atlantic region. The surface temperatures at these stations were all above 24.0 C. In the Pacific the species occurred in the warm Pacific region and throughout the southeast Pacific region. At the northern limits of the warm Pacific region the species occurred where the surface temperatures were as low as 19.1 C. In the southeast Pacific region it occurred at surface temperatures as low as 15.0 C. Thus, it was classified as a slightly tolerant tropical species.

Table 26. Records of occurrence of C. symmetricum at three levels

| Occur-               |               | Depth in meters |         |                   |                |              |  |  |
|----------------------|---------------|-----------------|---------|-------------------|----------------|--------------|--|--|
| rence                | 0             |                 | 50      |                   | 10             | 00           |  |  |
|                      | A             | В               | A       | В                 | Α              | В            |  |  |
| Rare                 | 10            | 2.6             | 31      | 11.0              | 45             | 17.7<br>13.4 |  |  |
| Occasional<br>Common | <b>2</b><br>0 | 0.5             | 23<br>3 | $\frac{8.1}{1.6}$ | <b>34</b><br>8 | 3.2          |  |  |
| Total                | 12            | 3.1             | 57      | 20.7              | 87             | 34.3         |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

Its relative abundance is also shown by the number of sample records. There were 156 records of occurrence, of which 86 were rare, 59 occasional, and 11 common. It

was found more frequently in the net samples, with 100 net records and 56 pump records.

Ceratium symmetricum is a pronounced shade species. Nielsen (1934) usually found it in the samples collected below the 50-meter level except at stations rich in plankton. The <u>Carnegie data</u> indicate a much greater frequency in the deeper levels (see table 26). Only 12 of the 156 records, or 3.1 per cent of the surface samples, were from the surface, whereas the species was found in 34.0 per cent of the 100-meter samples.

The species is quite common in oligotrophic water. Sixty-five of the 156 records of occurrence were in water containing less than 10 mg PO4/m³. The environmental conditions in situ were: temperature, 12°.1 to 29°.3 C; salinity, 30.7 to 37.1 per mille; pH, 7.90 to 8.39; phosphate, 3 to 152 mg PO4/m³.

### 31. Ceratium axiale Kofoid Figures 15D and E, chart 25, appendix table 29

This is a very rare intolerant tropical species. It was found only twice in the collections of the Meteor in the South Atlantic (Peters, 1934). Nielsen (1934) found it at nine stations in the Pacific in the South Equatorial and East Australian currents. The Carnegie collections extend the known range of the species both in the Northern and Southern hemispheres of the Pacific. It was not found in the Atlantic. It occurred at eleven Carnegie stations; two of these were in the southeastern Pacific, one off Japan, and the rest in the North Equatorial Current and north and east of Hawaii. It is probable that the species is more or less evenly distributed over the warm waters of the world but it is seldom collected because of its sparse numbers. In the Carnegie collection there were thirteen records of occurrence, of which eight were rare, three occasional, and two common.

The surface temperatures at the stations where it occurred, varied from 20°2 to 28°1 C. The ranges of environmental conditions in situ were: temperature, 15°6 to 27°6 C; salinity, 34.5 to 35.1 per mille; pH, 8.08 to 8.39; phosphate, 4 to 32 mg PO4/m3.

Five of the thirteen records were in water containing less than 10 mg PO<sub>4</sub>/m<sup>3</sup>.

All of Nielsen's (1934) records were from below 50-meter depths except one. The <u>Carnegie</u> data are in good agreement with his (see table 27). There was only one record from a surface sample and one from a 50-meter sample. The other eleven were from 100-meter samples. It is thus evident that <u>C. axiale</u> is unquestionably a shade species.

It is also of interest to note that eight of the records were from pump samples, whereas only five were from

Table 27. Records of occurrence of C. axiale at three levels

| Occur-     | Depth in meters |      |    |      |     |     |  |
|------------|-----------------|------|----|------|-----|-----|--|
| rence      | 0               |      | 50 |      | 100 |     |  |
|            | A               | В    | A  | В    | A   | В   |  |
| Rare       | 1               | 0.3  | 1  | 0.4  | 6   | 2.4 |  |
| Occasional | Õ               | **** | ō  | **** | 3   | 1.2 |  |
| Common     | 0               |      | 0  | **** | 2   | 0.7 |  |
| Total      | 1               | 0.3  | 1  | 0.4  | 11  | 4.3 |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

the net samples. Apparently the curved nature of the antapical horns permits the specimens to pass through the coarser nets.

# 32. Ceratium aultii n. sp. Figures 15F and G

Diameter, 55 microns; total length, 230 to 250 microns. The shape of the body is similar to those of <u>C. symmetricum</u> and <u>C. axiale</u>, except that the apical horn is displaced to the left. Curvatures of antapical horns resemble those of <u>C. axiale</u> except at the bases where the antapicals extend laterally from the body before they curve anteriorly.

Ceratium aultii was found at only two stations—one off Peru (station 72) and the other in the central part of the North Equatorial Current of the Pacific (station 151). It was found at 100 meters at both stations. At station 72 it was "common" in the net sample; at station 151 it was "rare" in the pump sample. The surface temperatures at the stations where it was found were 24.9 and 26.0 C. The temperatures in situ were: 14.8 at station 72, and 12.5 C at station 151.

#### 33. Ceratium azoricum Cleve Figures 16M-P, chart 26, appendix table 30

This species is a variable and little-known form. It is probably much more common than the number of records for it would indicate, since it is lost through the net because of its small size. It varies greatly in size (diameter from 38 to 50 microns), however, as well as in shape of body, and origin of antapical horns. The larger forms with spreading horns bear a close resemblance to C. petersii and may, in fact, be identical with this, i.e., C. petersii may represent simply one end of a line of variations of C. azoricum. At the other end of this line are the small specimens with horns close to the body. In the Carnegie collection a specimen was found which had a heavy list which joined the apical with the antapical horns (fig. 16M). This may be a new species as no definite intergrades were found between it and C. azoricum. Since only the one specimen was found, however, it was decided to postpone naming a new species until more material could be examined.

Ceratium azoricum is a very tolerant tropical species. Lebour (1925) stated that it is subtropical and is occasionally brought into the northern seas. In the Carnegie collection it was found in the region of Ireland and between Iceland and the Faeroes. In the latter region the surface temperature was 8.9 C. In the Pacific it was found at one station in the cold North Pacific region, where the surface temperature was 13.3 C. In the southeastern Pacific it was found at temperatures as low as 16.3 C. On the other hand, it occurred at temperatures as high as 29.5 C in the equatorial regions. It was found at a total of five stations in the Atlantic, only one of which was in the warm Atlantic region. In the Pacific it was found at twenty-three stations: one in the cold North Pacific region, seven in the southeast-Pacific region, and fifteen in the warm Pacific region. The total number of records was sixty, of which thirty-eight were rare, twentyone occasional, and one common. As stated above, the species is probably commoner than the reported records would indicate because it probably escapes through the

nets. Nevertheless, it was found more often in the net than the pump samples. There were thirty-three records (16 per cent) for the net samples and twenty-seven

records (14 per cent) for the pump samples.

Nielsen (1934) stated that <u>C. azoricum</u> is a typical surface species but this is not confirmed by the <u>Carnegie</u> data (see table 28). There are not sufficient deeper records, however, to warrant classifying <u>C. azoricum</u> as a typical shade species.

Table 28. Records of occurrence of C. azoricum Cleve at three levels

| Occur-     | Depth in meters |     |    |      |    |     |  |  |
|------------|-----------------|-----|----|------|----|-----|--|--|
| rence      |                 | 0   |    | 50   |    | 00  |  |  |
|            | A               | В   | A  | В    | A  | В   |  |  |
| Rare       | 16              | 4.2 | 14 | 5.0  | 8  | 3.2 |  |  |
| Occasional | 6               | 1.6 | 8  | 2.8  | 7  | 2.8 |  |  |
| Common     | _ 1             | 0.3 | 0  | **** | 0  |     |  |  |
| Total      | 23              | 6.1 | 22 | 7.8  | 15 | 6.0 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

The ranges of environmental conditions in situ were: temperature, 8.2 to 29.3 C; salinity, 32.7 to 36.0 per mille; pH, 7.85 to 8.39; phosphate, 7 to 176 mg PO<sub>4</sub>/m<sup>3</sup>.

Only two of the sixty records of occurrence were from water containing less than 10 mg PO4/m<sup>3</sup>.

## 34. Ceratium petersii Nielsen Figure 16L, chart 26, appendix table 31

As noted above, it is questionable whether this form should be considered separate from <u>C. azoricum</u> Cleve (see p. 30). For the present, however, it will be considered separately. Nielsen (1934) reported the species from southeast of New Zealand. The records of Peters (1934) for <u>C. bucephalum</u> in the South Atlantic were referred to <u>C. petersii</u> by Nielsen (1934), but the present authors cannot agree with this (see below). The <u>Carnegie</u> records for <u>C. petersii</u> were at six stations, all in the Pacific-five in the southeastern Pacific and one off the west coast of the United States. Thus it is probable that <u>C. petersii</u> is peculiar to the Pacific Ocean.

Geographically it has been difficult to classify <u>C. petersii</u>, partly because of the limited number of records and partly because of its peculiar distribution. It is either cosmopolitan or subpolar. The surface temperatures at its record stations varied from 16.9 in the South Pacific and 16.4 in the North Pacific to 21.2 off Peru. It could be classified as subpolar except for its peculiar distribution in the southeastern Pacific. No other subpolar form has shown such a distribution. It is tentatively considered to be a cosmopolitan species. There is, of course, the possibility that <u>C. petersii</u> is a cold-water subspecies of <u>C. azoricum</u> but this possibility is lessened by the fact that the typical <u>C. azoricum</u> is also found in cold water.

The total number of sample records for <u>C. petersii</u> in the <u>Carnegie</u> collection was fifteen, of which ten were rare, four occasional, and one common. Eight of the records were from net samples and seven were from pump samples.

The ranges of environmental conditions in situ were:

temperature, 10.°8 to 21.°2 C; salinity, 33.0 to 35.1 per mille; pH, 7.68 to 8.18; phosphate, 12 to 233 mg  $PO_4/m^3$ .

None of the records were in oligotrophic water. Nielsen (1934) found the species only in the samples from 50 to 0 meters. In the <u>Carnegie</u> collections there were six records for the surface, six for 50 meters, and three records for 100 meters. Thus it is probably a surface species.

### 35. Ceratium arietinum Cleve Figures 16A-K, chart 27, appendix table 32

This species is one of the most ill defined of the genus. It is composed of a great many variants, including <u>C. bucephalum</u> which is here treated as a subspecies.

Peters (1934) stated that in the <u>Meteor</u> material all the variation forms described by Jorgensen (1911 and 1920) were found, but two forms were more common—a small one and a large one. These intergraded but <u>f. gracilentum</u> was distinct.

The "large and small main form <u>C. arietinum arietinum</u>" was found in various regions of the South Atlantic but f. gracilentum was purely tropical, occurring between latitudes 12° north and 10° south with water temperatures over 22° C.

Nielsen (1934) stated that he found only one form in the South Pacific and that it corresponded to Jörgensen's <u>f. detortum</u> and <u>f. gracilentum</u>. Thus, apparently, Nielsen considered these two forms identical.

The <u>Carnegie</u> collection is particularly rich in variations of this species. Only the more important of these have been figured (figs. 164-K)

have been figured (figs. 16A-K).

The characteristic <u>arietinum</u> has the apical horn displaced to the left, whereas the right antapical horn is strongly incurved (fig. 16E). In f. <u>gracilentum</u> Jörgensen there is a distortion and lengthening of the apical horn, which is sharply curved proximally (fig. 16K). Jörgensen (1920) on the other hand, described a form, f. <u>regulare</u>, in which the apical horn is symmetrically placed. This form resembles <u>C. bucephalum</u> Cleve.

In the present collection the placement of the apical horn was extremely variable and showed transitions to

C. bucephalum (see figs. 16A-H).

Melsen (1934) classified Peters' (1934) southern form of <u>C. bucephalum</u> as a new species, <u>C. petersii</u>. The drawing of this species which Nielsen gives, however, is quite different from the one given by Peters. In our opinion these two forms cannot be included together. Peters' figure (plate 3, fig. 16c) is truly a form of <u>C. bucephalum</u>, which the authors have included as a subspecies of <u>C. arietinum</u>. Nielsen's figure (fig. 44), however, is probably a distinct species as he indicated. It is closely related to <u>C. azoricum</u> (which see).

The gracilentum form of the Pacific (fig. 16F) is different from that of the Atlantic (fig. 16K). The body is not nearly so distorted, the antapical contour is more nearly perpendicular to the axis of the apical horn, the body is relatively wide, and the apical horn is not so extended. The transitions between gracilentum and the typical arietinum, however, are continuous in both oceans.

It is very probable that several subspecies (in the geographic sense) are concerned in the present complex. Peters (1934) found f. gracilentum to be limited to the purely tropical waters between latitudes 12° north and 10° south with temperatures over 22° C. In the <u>Carnegie</u> collection this form was found farther north (to latitude 38.°5,

station 15) but the temperatures were quite high (24°8 C). In the Pacific this particular form does not occur. Its representative, however, (fig. 16F) is a warm-water form, although not markedly so because the form in the Pacific is not so distinct.

Bucephalum is truly of temperate- and cold-water origin. Figures 16D and E show the form from the North Pacific region, figure 16A from the Humboldt Current, and figure 16C from the southeast Pacific region. It is absent from the tropics and thus is bizonal as Peters (1934) first demonstrated.

Since <u>bucephalum</u> shows this geographic distribution, and since it intergrades with <u>C. arietinum</u>, it should be considered a subspecies of <u>C. arietinum</u>. Jörgensen's f. <u>gracilentum</u> is also a subspecies since it is limited to quite warm water. It is useless, however, to name the many variations and intergrades which occur among the subspecies as they are innumerable and apparently of no ecologic significance.

The species as a whole is a fairly common one. In the <u>Carnegie</u> collection it occurred at sixty-two stations—ten in the Atlantic and fifty-two in the Pacific. The total number of records was 123, of which 87 were rare, 30 occasional, 4 common, and 2 abundant. There were

67 net records and 56 pump records.

Nielsen reported <u>C. arietinum</u> as an outstanding deep-water species. This is substantiated by the <u>Carnegie</u> observations, which show the species much more frequent at the 100-meter level than at 50 meters or the surface (table 29). It was least frequent at the surface.

Table 29. Records of occurrence of C. arietinum at three levels

| Occur-     | Depth in meters |     |    |      |     |       |  |  |
|------------|-----------------|-----|----|------|-----|-------|--|--|
| rence      | 0               |     | 50 |      | 100 |       |  |  |
| renec      | Α               | В   | A  | В    | A   | В     |  |  |
| Rare       | 23              | 5.6 | 24 | 8.5  | 40  | 15.8  |  |  |
| Occasional | 6               | 1.6 | 13 | 4.6  | 11  | 4.3   |  |  |
| Common     | 1               | 0.3 | 2  | 0.7  | 1   | 0.4   |  |  |
| Abundant   | 1               | 0.3 | 1  | 0.4  | 0   | ***** |  |  |
| Total      | 31              | 7.8 | 40 | 14.2 | 52  | 20.5  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

As indicated by the wide range of the species, it is a rather eurythermal form. In the Atlantic it occurred at surface temperatures ranging from 11° to 27.5° C. In the Pacific the range was greater; from 6.9 (northeast of Japan) to 29.5° C (in the central tropics). The total ranges of environmental conditions in situ were: temperature, 1.6° to 29.5° C; salinity, 32.7° to 36.5° per mille, pH, 7.85° to 8.39; phosphate, 3 to 193 mg PO4/m³.

The species was found more frequently in the richer waters. Only 17 of the 123 records of occurrence were from water containing less than 10 mg PO4/m<sup>3</sup>.

36. Ceratium declinatum Karsten Figures 16Q-T, 17A-C, chart 28, appendix table 33

This is a very variable, slightly tolerant tropical species. Jörgensen (1911, 1920) made several varieties among the variants of the species. Peters (1934) designated three subspecies in his South Atlantic material; C. declinatum declinatum, C. declinatum angusticornum,

and <u>C. declinatum laticornum</u>. Melsen (1934) stated that he could not distinguish between Peters' <u>angusticornum</u> and <u>laticornum</u>, and in his South Pacific material he recognized only two "subspecies"--<u>declinatum</u> and <u>angusticornum</u>. These two forms occurred in the same regions so they are not subspecies in the sense used by Peters, who found a certain geographic segregation of the variants. When a world collection is studied, such as that of the <u>Carnegie</u>, it becomes evident that the species consists of a large number of intergrading units. The naming of these serves no useful purpose. They are not subspecies so far as can be determined, since they occur indiscriminately throughout the entire range of the species.

Seven of these variants are shown in figures 16Q-T and 17A-C. Some of these can be identified with named forms of other authors. Thus, figure 16S is similar to Jörgensen's var. majus; figure 16T to Peters' laticornum; figure 16Q to declinatum; figures 17A to C to angusticornum; whereas figure 16R, with outturned right antapical, has not been named.

In the <u>Carnegie</u> collection the species as a whole was found rather continuously throughout the warm Atlantic, warm Pacific, and southeast Pacific regions. It occurred at a total of ninety-eight stations--fourteen in the Atlantic and eighty-four in the Pacific. In the Atlantic it occurred at twelve stations in the warm Atlantic region and at one in the cold Atlantic region, where it doubtless was displaced by the Gulf Stream (station 3). In the Pacific it did not occur in the cold North Pacific region but was found off California at temperatures of 19.1 and 16.2 C at the northern part of the warm Pacific region. It occurred in the southern part of the southeast Pacific region at stations where the surface temperatures were as low as 16.9 C. In the warm Pacific region it occurred where the surface temperatures were as high as 29.5 C.

The environmental conditions in situ were as follows: temperature, 13.6 to 29.4 C; salinity, 31.7 to 37.1 per mille; pH, 7.17 to 8.42; phosphate, 3 to 123 mg PO4/m<sup>3</sup>.

The ubiquity of this species (within the tropics) is shown by the number of records, which was 204, of which 133 were rare, 67 occasional, and 4 common. Since it is a very small species, it was found more commonly in the pump samples. It occurred in 87 (16 per cent) net samples and 117 (32 per cent) pump samples.

It seemed to show no preference for oligotrophic water. Seventy-six of the 204 records of occurrence were from water containing less than 10 mg PO4/m<sup>3</sup>.

Nielsen (1934) stated that <u>C. declinatum</u> is definitely a surface form. The <u>Carnegie</u> records show a decrease in frequency with increase in depth (see table 30), but by no means do they indicate that the species is exclusively

Table 30. Records of occurrence of C. declinatum at three levels

| Occur-<br>rence      | Depth in meters |      |         |      |         |            |  |  |
|----------------------|-----------------|------|---------|------|---------|------------|--|--|
|                      | 0               |      | 50      |      | 100     |            |  |  |
|                      | A               | В    | A       | В    | A       | В          |  |  |
| Rare                 | 60              | 15.6 | 36      | 12.7 | 37      | 14.5       |  |  |
| Occasional<br>Common | 34<br>3         | 8.8  | 19<br>0 | 6.7  | 14<br>1 | 5.5<br>0.4 |  |  |
| Total                | 97              | 25.2 | 55      | 19.4 | 52      | 20.4       |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

a surface form even when due correction is made for contamination of the deeper net hauls. For instance, it was found in 25 per cent of the surface samples, but also in 21 per cent of the 100-meter samples.

37. Ceratium gibberum Gourret Figures 17D-G, chart 29, appendix table 34

This is a common, slightly tolerant tropical species which occurs rather uniformly throughout the warm waters of the world. Two varieties or subspecies are usually recognized. One, f. dispar Pouchet (fig. 17D), has a strongly curved right antapical horn and is common, whereas the other, f. subaequale Jörgensen (fig. 17F), has regularly curved horns and is rare. The latter was found by Peters (1934) in the South Atlantic in different regions, but it has not been reported before for the Pacific. In the Carnegie collections one specimen of this form was found (fig. 17F). This occurred off Japan at station 114; depth, 50 meters; temperature in situ, 16.2 C.

In f. <u>dispar</u> there is considerable variation in the height of the epitheca, curvature of horn, and placement of apical horn, but no further segregation of the group could be made. The Pacific and Atlantic specimens appeared to be identical. A two-celled chain was found at

station 48 at 100 meters (fig. 17E).

The species was found at a total of 115 stations--23 in the Atlantic and 92 in the Pacific. It was found at all but three stations in the warm Atlantic region, but not outside this region in the Atlantic (chart 29). In the Pacific it was found almost continuously at the stations in the warm Pacific region. It also occurred at ten stations in the southeast Pacific region, but was absent from the cold North Pacific region.

The total number of sample records for the species was 297, with 179 rare, 105 occasional, and 13 common. Of the total number, 221 were net records and 76 were

pump records.

The environmental conditions in situ were: temperature, 14.0 to 29.3 C; salinity, 29.7 to 37.0 per mille; pH, 7.17 to 8.47; phosphate, 2 to 178 mg  $PO_4/m^3$ .

Nielsen (1934) found that <u>C. gibberum</u> had its main vertical distribution above 50 meters. The <u>Carnegie</u> data show that the species occurs more frequently in the upper layers, with a decrease in frequency down to 100 meters (table 31).

Table 31. Records of occurrence of C. gibberum at three levels

| Occur-               | Depth in meters |             |         |            |         |            |  |
|----------------------|-----------------|-------------|---------|------------|---------|------------|--|
|                      |                 | 0           |         | 50         | 100     |            |  |
| rence                | A               | В           | A       | В          | A       | В          |  |
| Rare                 | 75              | 19.4        | 56      | 20.0       | 48      | 18.9       |  |
| Occasional<br>Common | 58<br>7         | 15.0<br>1.8 | 25<br>4 | 8.9<br>1.4 | 22<br>2 | 8.7<br>0.8 |  |
| Total                | 140             | 36.2        | 85      | 30.3       | 72      | 28.4       |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

38. Ceratium concilians Jörgensen Figures 17H-I, chart 30, appendix table 35

This species was formerly included in <u>C. gibberum</u> but was separated by Jörgensen (1920) and this separation has been accepted by later workers (Peters, 1934; Niel-

sen, 1934). Böhm (1931), however, figured C. gibberum under the caption of C. concilians Jörgensen.

Peters (1934) considered this species to be an indicator of warm oligotrophic water in the South Atlantic. Nielsen (1934), however, found that in the South Pacific the species is found as much in eutrophic oceanic water as in oligotrophic oceanic water. It did, however, seem to avoid neritic conditions. In the Carnegie collection in the Pacific it was found in both eutrophic and oligotrophic water. This feature could not be considered for the Atlantic as it was found at only one station there (in oligotrophic water). On the Carnegie cruise it was found in eutrophic water in the southeastern Pacific, again off Peru, and off California. On the other hand, it occurred in many waters poor in plankton and nutrients. thirty of the seventy-five records of occurrence for the species were in water containing less than 10 mg PO4/m<sup>3</sup>. It must be concluded that <u>C. concilians</u> is not limited to one type of water.

The species is not very common. In the <u>Carnegie</u> collection it was found at a total of forty-two stations, only one of which was in the Atlantic. The number of sample records was seventy-five, of which fifty-nine were rare, fourteen occasional, and two common. It is much less common than its close relative, <u>C. gibberum</u>. Since it is a fairly large form, it was found more frequently in the net samples. There were forty-seven net records and twenty-eight pump records.

The range of surface temperatures for the species is rather large for a tropical form, namely, from 16.°4 (station 128) to 29.°4 C (station 95). The ranges of environmental conditions in situ were: temperature, 12.°1 to 29.°3 C; salinity, 33.0 to 36.4 per mille; pH, 7.71 to 8.47; phosphate, 3 to 198 mg PO4/m³.

Nielsen (1934) designated <u>C. concilians</u> as a surface form. According to the <u>Carnegie</u> data, however, it is found about equally at the surface, 50 meters, and 100 meters (see table 32).

Table 32. Records of occurrence of C. concilians at three levels

| Occur-     | Depth in meters |     |    |     |     |     |  |  |
|------------|-----------------|-----|----|-----|-----|-----|--|--|
| rence      | 0               |     | 50 |     | 100 |     |  |  |
|            | A               | В   | A  | В   | A   | В   |  |  |
| Rare       | 24              | 5.3 | 17 | 6.0 | 18  | 7.1 |  |  |
| Occasional | 8               | 2.0 | 4  | 1.4 | 2   | 0.8 |  |  |
| Common     | 2               | 0.5 | 0  |     | 0   |     |  |  |
| Total      | 34              | 7.8 | 21 | 7.4 | 20  | 7.9 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

A form was found at station 130 (fig. 17I) which has rather regular antapical horns and thus represents a variety of <u>C. concilans</u> corresponding to var. <u>subaequale</u> of <u>C. gibberum</u>.

39. Ceratium lunula Schimper Figures 17J-N, chart 31, appendix table 36

Two forms of this species are commonly recognized; f. <u>brachyceros</u> with short apical horn and comparatively long antapicals; and f. <u>magaceros</u> with somewhat shorter antapicals but with long apical horn. The latter form

represents the anterior cell of a chain, whereas f. <u>brachy</u>ceros represents the remaining cells in the chain. It is inconsistent to name the two elements of a chain in this species alone as similar differences occur in the anterior and following cells of the other species as well.

In the Atlantic the species is distributed over the warm Atlantic region, extending to latitude 39° north, but it is absent from the cold North Atlantic region.

The distribution of C. lunula at Carnegie stations in the Pacific is unique among the Ceratium species (chart 31). It is similar to that of C. breve but even more restricted (see p. 27). It is definitely a tropical species and its distribution within the limits of 17° south and 20° north latitude is fairly continuous. It was not found outside these limits except in the western Pacific, where it extended in a continuous line to about 38° north off Japan (station 115). It was conspicuously absent in the loop of stations between the United States and Hawaii. It was also notably absent from all the stations in the southeastern Pacific south of 20° south. An explanation for this peculiar distribution is difficult to find. Certainly it has no relation to temperature as many of the stations where it does not occur have much higher temperatures than many of the stations where it was found. The nutrient content of the water cannot be a determining factor either. The area north and east of the Hawaiian Islands is extremely oligotrophic but so also is the region between Japan and Guam in the western Pacific, where the species was found in large numbers. Conversely, many stations in the southeast Pacific region are in eutrophic water and yet did not support this species. Is it possible that this species normally is confined within 20° of the equator in the Pacific except off Japan where it is displaced by the Kuroshio, or are the Carnegie records not representative?

Peters (1934) did not find <u>C. lunula</u> south of 30° south latitude in the South Atlantic. The records of the <u>Dana</u> (Nielsen, 1934) for the South Pacific fit in well with the distribution compiled from <u>Carnegie</u> data. Most of the <u>Dana</u> records duplicate records of the <u>Carnegie</u> between Panama and Samoa but its records extend somewhat west of Samoa. Nielsen, however, did not find the species south of 20° south. Thus, it is probable that the <u>Carnegie</u> records are representative and that the species normally is as restricted as these records indicate. Since the species is displaced northward off Japan, it is surprising that it is not also displaced southward in the region of Easter Island.

The total number of station records for the species in the <u>Carnegie</u> collection was sixty-eight, of which twelve were from the Atlantic and fifty-six from the Pacific. The total number of sample records was 144, of which 88 were rare, 52 occasional, and 4 common. The species was found much more frequently in the net samples, with 121 net records and only 23 pump records. Thirty of the 144 records were in water containing less than 10 mg PO<sub>4</sub>/m<sup>3</sup>.

Ceratium lunula was always found in water of high temperature. In the Atlantic the surface temperatures at its stations were all above 24° C, except one which was 20.5 C. In the Pacific the surface temperatures were above 20° except at one station off Japan, where it was 19.9 and at the Galapagos where it was 18.7 C. The ranges of environmental conditions in situ were: temperature, 11.4 to 29.3 C; salinity, 29.7 to 37.0 per mille; pH, 7.71 to 8.47; phosphate 3 to 220 mg PO4/m³.

Ceratium lunula is probably a shade species which comes to the surface in waters rich in plankton. Nielsen

(1934) found it in the deeper hauls in the stations poor in plankton. Jörgensen (1920) found it at greater depths in the Mediterranean during the summer months. The <u>Carnegie</u> records, not segregated according to richness of plankton, show the highest percentage of records at 50 meters and a greater percentage at 100 meters than at the surface (table 33). These records thus corroborate the classification of this species as a shade form.

Table 33. Records of occurrence of C. lunula at three levels

| Occur-     | Depth in meters |      |    |      |    |      |  |  |
|------------|-----------------|------|----|------|----|------|--|--|
| rence      |                 | 0    |    | 50   |    | 00   |  |  |
|            | A               | В    | A  | В    | A  | В    |  |  |
| Rare       | 35              | 9.1  | 30 | 10.7 | 23 | 9.0  |  |  |
| Occasional | 15              | 3.9  | 24 | 8.5  | 13 | 5.2  |  |  |
| Common     | 3               | 0.8  | 0  |      | 1  | 0.4  |  |  |
| Total      | 53              | 13.8 | 54 | 19.2 | 37 | 14.6 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

# 40. Ceratium carnegiei n. sp. Figures 18A-C

Transdiameter 92.5 (90 to 100) microns (six specimens measured). Curvature of antapical horns similar to that in <u>C. lunula</u>. Apical horn long and straight or slightly curved to right. Body of epitheca slightly to greatly inflated. In extreme cases the walls are parallel for about one transdiameter from the girdle, at which point they may be expanded to greater than girdle diameter. Body walls thick and covered with numerous lists as in the heavy specimens of <u>C. lunula</u>.

The species was found at four stations, all in the Pacific. At one of these, station 71 off Peru, the body was not much inflated. The most extreme cases were found at the warmer stations, stations 151, 152, and 158. It occurred at the surface at station 71, but at 50- and 100-meter depths at the other stations. The surface temperatures at the stations where it was found, varied from 23.°5 to 28.°2 C. The environmental conditions insitu were: temperature, 12.°5 to 27.°6 C; salinity, 35.9 to 34.0 per mille; pH, 7.87 to 8.39; phosphate, 48 to 58 mg PO4/m³.

## 41. Ceratium contortum Cleve Figures 18D-N, chart 32, appendix table 37

There has been much confusion in the literal regarding of the taxonomy of both <u>C. contortum</u> Cleve and <u>C. karstenii</u> Pavillard (<u>C. arcuatum</u> Cleve). After a thorough study of the extensive material of the <u>Carnegie</u> collection, the writers came to the conclusion that these two species represent variants of a single species. The difficulties of previous workers probably have been owing in large part to the fact that they were attempting to differentiate between these two forms when in fact they do not exist and the separation is an artifical one.

Thus, Jörgensen (1911) in his monograph gives <u>C. karstenii</u>, <u>C. longinum</u>, and <u>C. contortum</u> as distinct species. <u>Ceratium contortum</u> is characterized by slightly distorted body and slightly inward-bent right antapical horn, except in var. <u>saltans</u> Schröder, which has a very

decidedly distorted body and sharply bent right antapical horn. Jörgensen's figure of <u>C. karstenii</u> (fig. 117a), however, shows a specimen with a curled right antapical horn, which is certainly to be considered a double bending and represents a zone of instability in the same position as the bending in the horn of <u>contortum</u>. He represented <u>C. longinum</u> as more slender than <u>C. karstenii</u> and with longer and straight antapical horns. He also separated from <u>C. karstenii</u>, var. <u>robustum</u>, a variety which is more robust than the main species and has shorter and straight antapical horns. This form resembles <u>C. tripos</u>.

Later, Forgensen (1920) found all intergrades between C. karstenii and var. robustum so he no longer consid-

ered it even a good variety.

Peters (1934) treated <u>C. longinum</u> as a variety of <u>C. karstenii</u>. He apparently considered <u>saltans</u> a distinct variety of <u>C. contortum</u>, but does not give a figure of the main species. His figures of <u>C. karstenii</u> and <u>C. contortum</u> (figs. 10e and g, plate 2) show equally distorted bodies. Nielsen (1934), in his study of the <u>Dana</u> South Pacific material, treated <u>C. karstenii</u> and <u>C. contortum</u> separately. He agreed with Peters (1934), however, that varrobustum cannot be separated from <u>C. karstenii</u>. He stated that he did not find <u>C. longinum</u> in his collections but his figure of <u>C. contortum</u> f. <u>subcontortum</u> (fig. 52) answers well to this form. He considered it a shade form of C. contortum.

In the Carnegie collections every possible intergrade was found between C. contortum, C. longinum, and C. karstenii, and the varieties robustum and saltans (see fig. 18). There are heavy forms and light forms; some with long horns and some with short. There are specimens with kinked horns, but not much distorted body; and, on the other hand, specimens with regular body, but bent horns. The right antapical may bend in or out, or may trail off in an attenuated manner. The extreme forms were represented by var. saltans and usually were smaller than the others and it was thought for a while that a separation of two species could be made on this basis. After measuring many specimens from all localities, however, it was found that this was impossible. There is indeed a great variation in size. The transdiameters range from 52 microns in the smaller specimens of saltans to 110 microns in the more robust specimens. There was no segregation into size groups, however; the greatest number of specimens had transdiameters ranging between 70 and 85 microns.

Ceratium contortum is a common, slightly tolerant tropical species. It was found at practically all stations in the warm Atlantic, warm Pacific, and southeast Pacific regions, but was completely absent from the cold North Atlantic and cold Pacific regions (chart 32).

Nielsen (1934) listed <u>C. longinum</u> Karsten as an Atlantic form absent from the Pacific. It occurred in the <u>Carnegie</u> collection, however, at many stations in the Pacific.

The commonness of the species is shown by the large number of sample records, namely, 461, of which 194 were rare, 178 occasional, 84 common, and 5 abundant. The net records for the species totaled 327; the pump records, 134.

The range of surface temperatures at the stations where the species occurred, varied from 16.3 to 29.5 C. The ranges of environmental conditions in situ were: temperature, 11.4 to 29.4 C; salinity, 30.0 to 37.1 per mille; pH, 7.17 to 8.47; phosphate, 2 to 138 mg PO4/m<sup>3</sup>.

Many of the specimens have attenuated and sometimes curved antapical horns which are extremely thin-walled. It is probable that this is an adjustment to shade conditions. Nielsen (1934) considered the subcontortum form (longinum?) a shade form of C. contortum. In the Carnegie material var. saltans showed a greater frequency at greater depths than did the more regularly-shaped forms. Although the more robust forms sometimes occurred with thin antapicals, this condition was much more common in the saltans group. In the others the larger specimens were much more predominantly surface forms. Among the specimens more than 80 microns in diameter, there were twice as many surface records as 50-meter records and very few at 100 meters. Of the specimens less than 80 microns in diameter, the number of records at the surface and 50 meters was about equal, although the number at 100 meters was almost negligible. Among saltans, too, the greatest frequency was at the surface. The percentages for the species as a whole show a predominance at the surface (see table 34).

Table 34. Records of occurrence of C. contortum at three levels

| Occur-     |     | Depth in meters |     |      |     |      |  |  |  |
|------------|-----|-----------------|-----|------|-----|------|--|--|--|
| rence      |     | 0               |     | 50   |     | 00   |  |  |  |
| rence      | A   | В               | A   | В    | A   | В    |  |  |  |
| Rare       | 95  | 27.7            | 54  | 19.2 | 45  | 17.7 |  |  |  |
| Occasional | 80  | 20.7            | 53  | 18.7 | 45  | 17.7 |  |  |  |
| Common     | 34  | 8.8             | 33  | 11.7 | 17  | 6.7  |  |  |  |
| Abundant   | 4   | 0.2             | 0   |      | 1   | 0.4  |  |  |  |
| Total      | 213 | 57.4            | 140 | 49.6 | 108 | 42.5 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

42. Ceratium limulus Gourret Figure 19A, chart 33, appendix table 38

This is a rather rare intolerant tropical species which is quite characteristic and not very variable. Peters (1934) considered this species an indicator of warm oligotrophic water in the South Atlantic; but Nielsen (1934) found it in both oligotrophic and eutrophic water in the South Pacific, with its greatest abundance in eutrophic water. In the <u>Carnegie</u> collection it was found only in oligotrophic water in the Atlantic, but in both eutrophic and oligotrophic water in the Pacific. Is it possible that the Atlantic form is less adaptable in this regard than the Pacific form?

The species was found at fifty-five stations—nine in the Atlantic and forty—six in the Pacific. The Atlantic stations were confined to the warm Atlantic region where the surface temperatures were high (from 24.8 to 27.6 C) and the nutrient content of the water was low. The phosphate values for the upper 50 meters were all below 11 mg PO4/m³. In the Pacific the stations were confined to the warm Pacific region for the most part, although there were six stations in the southeast Pacific region. The range of conditions at the Pacific stations was much greater than those at the Atlantic stations. For instance, the surface temperatures varied from 18.7 to 29.3 C, and the mean phosphate value for the upper 50 meters varied from 4 to 83 mg PO4/m³. It should be noted, however, that all stations were remote from continents.

The ranges of environmental conditions in situ for the species at all stations were as follows: temperature, 13.8 to 28.2 C; salinity, 33.9 to 36 per mille; pH, 8.47 to 7.80; phosphate, 4 to 150 mg PO4/m<sup>3</sup>.

Thirty of the eighty-eight records were from water

containing less than 10 mg PO4/m3.

The total number of sample records for the species was eighty-eight, of which eighty-five were rare and three occasional. There was a large proportion of pump records owing to the small size of the species (thirty-nine pump records and forty-nine net records).

Ceratium limulus apparently lives at various depths but is found somewhat more frequently in the upper levels. Bohm (1931) found it in the Adriatic as deep as 200 meters. Nielsen (1934) found it predominantly in the 50-to 0-meter samples. In the <u>Carnegie</u> collection the species was found with decreasing frequency with increase in depth to 100 meters (table 35), although the frequency at 100 meters (in percentage) was more than half that at the surface.

Table 35. Records of occurrence of C. limulus at three levels

| Occur-             |         | Depth in meters |         |            |         |     |  |  |  |
|--------------------|---------|-----------------|---------|------------|---------|-----|--|--|--|
| rence              | 0       |                 | 50      |            | 100     |     |  |  |  |
| rence              | A       | В               | A       | В          | A       | В   |  |  |  |
| Rare<br>Occasional | 39<br>2 | 10.1<br>0.6     | 28<br>1 | 9.9<br>0.4 | 18<br>0 | 7.1 |  |  |  |
| Total              | 41      | 10.7            | 29      | 10.3       | 18      | 7.1 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

43. Ceratium paradoxides Cleve Figure 19B, chart 34, appendix table 39

This is a rare intolerant tropical species. Peters (1934) found it in both oligotrophic and eutrophic water in the South Atlantic. Nielsen (1934) found it scattered over the region traversed by the <u>Dana</u> from Panama to Australia. It is never common and its distributional records are discontinuous for this reason.

In the <u>Carnegie</u> collection the species was found at sixty-four stations—thirteen in the Atlantic and fifty-one in the Pacific. In the Atlantic the stations were confined to the warm Atlantic region. In the Pacific they were restricted to the warm Pacific region and the southeast Pacific region (see chart 34).

There were ninety-one records of occurrence, of which eighty were rare and eleven occasional. Sixty-six of these records were from net samples and twenty-five were from pump samples.

Nielsen (1934) stated that <u>C. paradoxides</u> is a shade species, and this is corroborated by the <u>Carnegie</u> observations. In fact, its vertical distribution is most decidedly stratified. As shown in table 36, there were only six records for the surface samples (representing only 1.6 per cent of the samples), whereas the species was found in 22.8 per cent of the 100-meter samples.

The surface temperatures at the stations where <u>C. paradoxides</u> occurred in the Atlantic varied from 20.5 to 27.6 C; in the Pacific from 19° to 29.5 C. The environmental conditions in situ were as follows: temperature, 12.1 to 29.3 C; salinity, 33.4 to 37.0 per mille; pH, 7.17

to 8.39; phosphate, 4 to 123 mg  $PO_4/m^3$ . It was found in both eutrophic and oligotrophic water. Thirty-four of the ninety-one records were in water containing less than 10 mg  $PO_4/m^3$ .

Table 36. Records of occurrence of C. paradoxides at three levels

| Occur-     | Depth in meters |     |    |     |     |      |  |  |
|------------|-----------------|-----|----|-----|-----|------|--|--|
| rence      |                 | 0   | 50 |     | 100 |      |  |  |
| rence      | A               | В   | A  | В   | A   | В    |  |  |
| Rare       | 5               | 1.3 | 26 | 9.2 | 49  | 19.3 |  |  |
| Occasional | 1               | 0.3 | 1  | 0.4 | 9   | 3.5  |  |  |
| Total      | 6               | 1.6 | 27 | 9.6 | 58  | 22.8 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

44. Ceratium platycorne Daday Figures 19C-H, chart 35, appendix table 40

This is a rare, slightly tolerant tropical species. Varieties of the species have been described, but these are of no particular importance. Variety <u>cuneatum</u> Jörgensen is not distinguishable from the main species. Its shorter truncated antapical horns probably are owing to autotomy or accidental breaking of the distal part of the horns. It is probable that the jagged edges of these horns never represent the original condition. Figure 19D shows a specimen with broken (truncate) right antapical which is shorter than the left. The right is normally longer than the left. Variety <u>lamellicorne</u> is somewhat more distinct. Nielsen (1934) found it quite distinct in the <u>Dana</u> collections. It is, however, simply a narrowhorned variant and intergrades are not absent (fig. 19G).

Ceratium platycorne is widespread over the tropical waters of the world and is sometimes displaced by currents. It has been found by others in the northern waters of the Atlantic (Paulsen, 1908; Lebour, 1925). In the Carnegie collection it occurred off Iceland, with a surface temperature of 12.°44 C. Otherwise, in the Atlantic it was confined to the warm Atlantic region, with surface temperatures above 20° C. In the Pacific it was limited to the warm Pacific and southeast Pacific regions, with surface temperatures ranging from 19.°27 to 28.°74 C. The ranges of environmental conditions in situ were: temperature, 12.°4 to 27.°6 C; salinity, 34.1 to 37.0 per mille; pH, 7.87 to 8.39; phosphate, 4 to 152 mg PO4/m³.

Peters (1934) found <u>C. platycorne</u> widespread in oligotrophic water in the South Atlantic, and Nielsen (1934) found it in the entire region between Panama and Australia. In the <u>Carnegie</u> collection it did not show any preference for one type of water. Eighteen of the fifty-three records of occurrence were from water containing less than  $10~\text{mg}~\text{PO4/m}^3$ .

The species is not common. There were only forty-three stations at which it was found, of which fourteen were in the Atlantic and twenty-nine in the Pacific. The total number of records (fifty-three) is relatively small. Of these, forty-four were rare, eight occasional, and one common. There were thirty-eight net records, and fifteen pump records.

<u>Ceratium platycorne</u> is distinctly a shade species. The records indicate this even more definitely than in

the case of <u>C. paradoxides.</u> Of the fifty-three records, only one was from the surface, whereas there were thirteen from 50 meters, and thirty-nine from 100 meters. The percentages are even more striking (table 37).

Table 37. Records of occurrence of C. platycorne at three levels

| 0          | Depth in meters |      |    |      |    |      |  |
|------------|-----------------|------|----|------|----|------|--|
| Occur-     |                 | 0    |    | 50   |    | 00   |  |
| rence      | A               | В    | A  | В    | A  | В    |  |
| Rare       | 1               | 0.3  | 11 | 3.9  | 32 | 12.6 |  |
| Occasional | 0               | **** | 2  | 0.7  | 6  | 2.4  |  |
| Common     | 0               |      | 0  | **** | 1  | 0.4  |  |
| Total      | 1               | 0.3  | 13 | 4.6  | 39 | 15.4 |  |

A=Number of records. B=Fer cent of total number of samples collected at that depth.

45. Ceratium ranipes Cleve Figures 19I-K, 20, 21A, chart 36, appendix table 41

This is a rather common, slightly tolerant tropical species. It is variable in respect to the number of "fingers;" there may be three or four (fig. 21A) or 19 and 21 (fig. 20). The "few-fingered" forms were formerly segregated as var. ranipes of C. palmatum but, since a complete intergradation between it and the main species is commonly found, the variety recently has been disregarded (Peters, 1934; Nielsen, 1934). There is a great variation in the length of the antapical horns. The long horns usually have fewer fingers (cf. figs. 19I, 21A). A specimen was found in the Carnegie collection with an extremely large number of fingers (fig. 20). There were nineteen on the left horn and twenty-one on the right. According to the theory of shade forms (Nielsen, 1934), extreme flattening of the ends of the hind horns and their division into a number of linear branches represents an adaptation of the species to shade conditions. This is substantiated by the fact that the hind horns and fingers are densely packed with chromatophores, and is conclusively shown by the vertical distribution of species records (see below).

The horizontal distribution of <u>C. ranipes</u> is typical of slightly tolerant tropical species. It shows a slight tendency to drift out of the tropical regions. It was found at a total of seventy-nine <u>Carnegie</u> stations--twenty-one in the Atlantic and fifty-eight in the Pacific. In the Atlantic the stations were all confined to the warm Atlantic region, with the exception of one (station 3) where the species was displaced into colder water (surface temperature 15.5 C). In the Pacific the stations were limited to the warm Pacific region and the southeast Pacific region. The range of surface temperatures at the Pacific record stations was 18.7 to 29.5 C.

The ranges of environmental conditions in situ for both oceans were as follows: temperature, 13.1 to 29.3 C; salinity, 33.7 to 36.8 per mille; pH, 8.00 to 8.47; phosphate, 2 to 99 mg PO<sub>4</sub>/m<sup>3</sup>.

<u>Ceratium ranipes</u> probably is more or less uniformly distributed in all tropical waters. Peters (1934) found a slight indication of preference for oligotrophic water in the South Atlantic, but Nielsen (1934) found the species in both eutrophic and oligotrophic water and even in neritic conditions in the South Pacific. In the <u>Carnegie</u> collection no preference for oligotrophic water was indicated.

Forty-seven of the 147 records of occurrence were in water containing less than 10 mg  $PO_4/m^3$ .

<u>Ceratium ranipes</u> is a fairly common species, as indicated by <u>Carnegie</u> records. There was a total of 148 records of occurrence, with 116 rare and 32 occasional. Thirty-nine of these were pump records and 108 were net records.

<u>Ceratium ranipes</u> is definitely a shade species. Nielsen (1934) found it at deeper levels except at stations rich in plankton where it was found mostly above 50 meters. In the <u>Carnegie</u> collection the species was found with increasing frequency with increase in depth down to 100 meters. Expressed in percentage, the number of records at 100 meters was more than twice that at the surface (see table 38).

Table 38. Records of occurrence of C. ranipes at three levels

| 0                  | Depth in meters |            |          |             |          |             |  |  |
|--------------------|-----------------|------------|----------|-------------|----------|-------------|--|--|
| Occur-<br>rence    | 0               |            | 50       |             | 100      |             |  |  |
| rence              | A               | В          | A        | В           | A        | В           |  |  |
| Rare<br>Occasional | <b>3</b> 0<br>8 | 7.8<br>2.1 | 42<br>12 | 14.9<br>4.2 | 44<br>12 | 16.9<br>4.7 |  |  |
| Total              | 38              | 9.9        | 54       | 19.1        | 56       | 21.6        |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

46. Ceratium macroceros (Ehrenberg) Vanhöffen Figures 21B-F, chart 37, appendix table 42

Ceratium macroceros is a semicosmopolitan species with a peculiar distribution. In the Atlantic there are two subspecies (Jörgensen, 1911, 1920). One, commonly called the main species, is northern and extends south to the Bay of Biscay and the northern parts of the Gulf Stream. For convenience, it is here named subsp. macroceros n. subsp. The tropical form is subsp. gallicum Kofoid. Jörgensen (1920) found only subsp. gallicum in the Mediterranean. Peters (1934) stated that in the South Atlantic subsp. gallicum predominated everywhere except in regions VI and VII (south of Africa and westward in the general latitude of 40° south), where there was a form similar to the main species of the North Atlantic. Unfortunately, he did not figure this form. It may be an antarctic subspecies indicating a bipolarity in the Atlantic. Nielsen (1934) found only subsp. gallicum in the South Pacific. In the Carnegie collections in the Atlantic the two subspecies characteristic of the North Atlantic were found. Subspecies macroceros occurred north of 40° north and at two stations south of this latitude, stations 15 and 16. Conversely, subsp. gallicum occurred principally at the tropical stations but also at one station north of 40° north, station 13. The specimens there, however, were not typical of the tropical subspecies but were in the nature of intergrades.

The northern subspecies, subsp. macroceros n. subsp., differs from subsp. gallicum in its size, shape, and curvature of antapical horns. The transdiameter of the northern form is usually from 50 to 55 microns, whereas in subsp. gallicum it is less than 50 microns. The northern form is more robust generally, and the body is somewhat longer. The antapical horns in the two forms leave the body at about the same angles but in subsp. gallicum they

are much more abruptly turned anteriorly and all their horns are thinner (cf. figs. 21E and F).

The species as a whole is one of the most common of the genus. It was found at 148 stations--42 in the Atlantic and 106 in the Pacific. It was found frequently in all the samples from a station so that the total number of sample records for the species is large, namely, 482. Of these, 226 were rare, 201 occasional, 54 common, and 1 abundant. Net records predominated, of which there were 307 as compared with 175 pump records.

When dealing with a species as common as this one, a series of negative records is significant. In this connection it is interesting to turn to the distribution of the species in the North Pacific (chart 37). Subspecies gallicum was found at every station in the warm Pacific region except one off Japan, where its northern distribution in the west ended abruptly at about 38° north latitude. In the east, off California, the northern limit was equally abrupt but there it was above 40° north latitude, with one station in the cold North Pacific region. Otherwise, no representative of C. macroceros was found in the cold North Pacific region. The absence of subsp. macroceros in this area is a good indication of the planktologic isolation of the North Pacific (see p. 11).

In the South Pacific in this species we find evidence of the continuity of the colder waters of all the southern oceans. In the extreme southeastern part of the area traversed by the <u>Carnegie</u> the species assumed the aspect of subsp. <u>macroceros</u> (fig. 21C). This is possibly the southern form mentioned by Peters (1934) from the Atlantic.

Subspecies gallicum may be classified as slightly tolerant tropical. Off Japan it extended into water with surface temperature of 19.°9; off the west coast of America to temperature of 16.°4, and in the southeast Pacific to 15.°0 C. In the Atlantic subsp. gallicum occurred at surface temperatures of about 20° C, except at station 13, where the temperature was 11.°3 C.

The ranges of environmental conditions in situ were: temperature, -1.6 to (29.4) C; salinity, 31.7 to 37.1 per mille; pH, 7.17 to 8.47; phosphate, 2 to 123 mg PO4/m<sup>3</sup>.

It should be noted that the species was not found at a line of stations off Peru nor between the Galapagos Islands and Panama with the exception of two stations. The waters here, especially off Peru, are eutrophic; the phosphate content in the upper 50 meters is mostly above 50 mg PO4/m3. Is it possible that this accounts for the absence of C. macroceros? The temperatures at these stations were mostly above 20° C, so temperature hardly can be responsible. Possibly C. macroceros avoids high concentrations of nutrients. In this connection it should be noted that in the North Atlantic, where C. macroceros occurs at low temperatures, the phosphate content in the upper 50 meters is mostly below 50 mg, whereas in the northern North Pacific, where the species is absent, it is mostly above 100 mg. These conditions must be taken into account in any attempt to explain the distribution of this species. It was pointed out in the general discussion (p. 7), however, that it is not likely that the concentration of such plant nutrients as phosphate and nitrate found in the oceans are important in the qualitative distribution of Ceratium species.

<u>Ceratium macroceros</u> occurs rather uniformly down to the 100-meter depth. Nielsen (1934) found it mostly above 50 meters, but in the <u>Carnegie</u> collection the greatest percentage was at 50 meters, with slightly lower percentages at the surface and 100 meters (table 39).

Table 39. Records of occurrence of C. macroceros at three levels

| Occur-     |     | Depth in meters |     |      |     |       |  |  |  |
|------------|-----|-----------------|-----|------|-----|-------|--|--|--|
| rence      | 0   |                 | 50  |      | 1   | 00    |  |  |  |
| Tence      | A   | В               | A   | В    | A   | В     |  |  |  |
| Rare       | 94  | 24.1            | 79  | 28.0 | 54  | 21.2  |  |  |  |
| Occasional | 75  | 19.5            | 75  | 26.6 | 51  | 20.1  |  |  |  |
| Common     | 25  | 6.5             | 20  | 7.1  | 9   | 3.5   |  |  |  |
| Abundant   | 1   | 0.3             | 0   | **** | 0   | ***** |  |  |  |
| Total      | 195 | 50.4            | 174 | 61.7 | 114 | 44.8  |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

47. Ceratium massiliense (Gourret) Jörgensen Figures 22E-L, chart 38, appendix table 43

Ceratium massiliense is one of the most variable and difficult species of the genus. The typical form is shown in figure 22F (which, incidently, is a two-celled chain). It has the most common form of body, although the horns frequently are much shorter. Variety armatum (Karsten) Jörgensen is shown in figure 22L. This was rare in the Carnegie collection. Peters (1934) considered it to be a cold-water subspecies in the South Atlantic, but in our collection no correlation with lower temperature was evident. Variety protuberans (Karsten) Jörgensen is another variation of the species which has been recorded in the literature. It has a somewhat elongated body and thin antapical horns, which are somewhat more widely spread than in the typical form (fig. 221). There is a form in the Atlantic which simulates somewhat C. deflexum (fig. 22H). This probably accounts for Peters' (1934) including <u>C. deflexum</u> in the species <u>C. massiliense</u> (see next species below). It will be noted that in this variety of C. massiliense the left antapical horn, where it leaves the body, is directed slightly antapically so the posterior curvature of the horn and the posterior edge of the body are not in the same line. The right antapical is directed somewhat more posteriorly than in the main form of the species. This type of divergence, as regards antapical horns, may be accentuated even more, so that the specimens resemble, to a degree, C. macroceros (fig. 22G). In this case the curvatures of the antapical horns extend to a distance about 0.5 transdiameter beyond the body. A variation of this is shown in figure 22J in which the right horn does not extend far posteriorly but laterally. Still another variation was found in which the origins of the antapicals are more lateral than in the main species, and the horns themselves are much more widespread (fig. 22K).

Most of the <u>Carnegie</u> material of this species could be placed in one of the above nine varieties. Intergrades were fairly common, however, so the complex as a whole represents a single variable species. The varieties showed no correlation with geographic position or hydrographic conditions, except that the <u>deflexum</u> type was confined to the Atlantic.

There is also a form which tends toward the body shape of <u>C. contrarium</u> (fig. 22E). The left antapical leaves the body in line with the posterior edge of the body; the right extends somewhat posteriorly. The horns are slender. A four-celled chain was found in this form.

The species, as a whole, is one of the most common

of the genus. It is a very tolerant tropical species which may be displaced by currents. It was found at a total of 152 stations -- 28 in the Atlantic and 124 in the Pacific. In the Atlantic it was found at practically every station in the warm Atlantic region and at three stations in the cold Atlantic region, the most northern of these being station 6c off Ireland where the surface temperature was 12.4 C. In the Pacific it occurred almost continuously throughout the warm Pacific and southeast Pacific regions. It extended northward at either side of the Pacific, somewhat beyond the limits of this region: off Japan to station 116 where the surface temperature was 16.1 C; and off the United States to station 128, surface temperature 16.4 C. In the southeastern Pacific it occurred at the southernmost station, station 60, where the surface temperature was 15.0 C.

The environmental conditions <u>in situ</u> were: temperature, 10.6 to 29.5 C; salinity, 29.7 to 37.0 per mille; pH, 7.17 to 8.47; phosphate, 2 to 233 mg PO<sub>4</sub>/m<sup>3</sup>.

Of the 476 records, 194 were from water containing

less than 10 mg PO4/m3.

The species is quite common, as shown by the number of sample records which totaled 479. Of these, 159 were rare, 210 occasional, 102 common, and 8 abundant. Net samples predominated, with 348 records as against 131 pump records. The large number of net records doubtless was owing to the large spread of the horns which made the capture of this species efficient in the coarser cloth of the tow net.

Nielsen (1934) classified <u>C. massiliense</u> as a surface species. The <u>Carnegie</u> data corroborate this (table 40). The species was found with decreasing frequency with increase in depth although the decrease was not great.

Table 40. Records of occurrence of C. massiliense at three levels

| Occur-     |     | Depth in meters |     |      |     |      |  |  |  |
|------------|-----|-----------------|-----|------|-----|------|--|--|--|
| rence      |     | 0               |     | 50   |     | 00   |  |  |  |
| rence      | A   | В               | A   | В    | A   | В    |  |  |  |
| Rare       | 65  | 16.9            | 45  | 15.6 | 49  | 18.9 |  |  |  |
| Occasional | 96  | 24.9            | 65  | 22.3 | 49  | 19.3 |  |  |  |
| Common     | 55  | 14.3            | 31  | 11.0 | 16  | 6.3  |  |  |  |
| Abundant   | 5   | 1.3             | 2   | 0.7  | 1   | 0.4  |  |  |  |
| Total      | 221 | 57.4            | 143 | 49.6 | 115 | 44.9 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

48. Ceratium deflexum (Kofoid) Jörgensen Figures 22C-D, chart 39, appendix table 44

Ceratium deflexum is an intolerant tropical species, probably restricted to the Pacific and Indian oceans. Peters (1934), in his study of the material of the Meteor from the South Atlantic, included C. deflexum as a variation of C. massiliense. Unfortunately, he did not give a figure of it. Undoubtedly it was the variety mentioned above (p. 38, fig. 22H), which is a variant of C. massiliense but is not to be identified with C. deflexum. Ceratium deflexum is characterized by a ventral curvature of the antapical horns (fig. 22D) which is not found in any of the variants of C. massiliense. In addition to this, the posterior extension of the horns is much greater than in C. massiliense. Ceratium deflexum is a distinctive species and is easily recognized after it has been observed once.

In the <u>Carnegie</u> collection it was found at fifty-three stations--all in the Pacific. There were 105 records of occurrence, of which 58 were rare, 34 occasional, and 13 common. Eighty-four were from net records and 21 were from pump records.

Most of the stations were concentrated in the eastern and central Pacific between latitudes 20° north and 20° south, except for one station at Japan and two stations in the southern part of the southeast Pacific region. The species probably is not as limited in its distribution as the <u>Carnegie</u> data indicate, since it was found off San Diego, California by Kofoid (1907a), in the China Sea south of 20° north latitude by Böhm (1931), and in the Indian Ocean by Jörgensen (1911).

The species was found only at stations with high temperatures, except at the two stations to the southeast. The surface temperatures at the main group of stations ranged from 18.7 to 29.3 C; at the two stations in the southeast, 16.9 and 19.2 C. The ranges of environmental conditions in situ were: temperature, 10.8 to 29.3 C; salinity, 29.7 to 36.5 per mille; pH, 7.82 to 8.47; phos-

phate, 4 to 166 mg PO4/m3.

The curious distribution of this species may be owing to a preference for eutrophic water. In the large oligotrophic area of the North Pacific, where the average phosphate content of the upper 50 meters was less than 10 mg PO4/m³, there were only nine stations. Its absence off Peru might be attributed, then, to lower temperatures, and its absence in the Easter Island region to oligotrophic conditions. The greatest number of stations were in the regions where the average phosphate content was above 25 mg and the greatest populations were found at stations where the phosphate content was above 25 or 50 mg PO4/m³. In this connection it is to be noted that of the 107 sample records for the species, only 11 were in water containing less than 10 mg PO4/m³.

The species is a surface form. In the <u>Carnegie</u> collection it was found with decreasing frequency with increase in depth (see table 41). Thus, it was found in 15.5 per cent of the surface samples and only 6.7 per cent of the 100-meter samples. Because of contamination of the deeper hauls, the real distribution is probably even more definitely a surface one than the present data indicate.

Table 41. Records of occurrence of C. deflexum at three levels

| Occur-<br>rence              | Depth in meters |                   |               |                   |              |                   |  |  |
|------------------------------|-----------------|-------------------|---------------|-------------------|--------------|-------------------|--|--|
|                              | 0               |                   | 50            |                   | 1            | 00                |  |  |
|                              | A               | В                 | A             | В                 | A            | В                 |  |  |
| Rare<br>Occasional<br>Common | 32<br>19<br>11  | 8.0<br>4.7<br>2.8 | 16<br>11<br>1 | 5.7<br>3.9<br>0.3 | 11<br>5<br>1 | 4.3<br>1.9<br>0.4 |  |  |
| Total                        | 62              | 15.5              | 28            | 9.9               | 17           | 6.6               |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

49. Ceratium carriense Gourret Figure 22A, chart 40, appendix table 45

This is a rather variable species of uncertain taxonomic position. Certain varieties have been named which show characteristic spread of horns (for instance, var. yolans Cleve and f. ceylonicum Schröder), but in the

Carnegie collection many intergradations were found between these and still other variants so they have not been recorded. Some of the variants are similar to modifications of <u>C. massiliense</u>. Indeed, these two species may be identical. They have been kept separate in this report on the basis of the origin of the left antapical horn which in <u>C. carriense</u> starts in a posterior direction before curving laterally, so at its proximal end it does not form a straight line with the posterior edge of the body. The demarcation was indefinite, however, with numerous intergrades.

The distribution of the species as considered here is similar to that of <u>C. massiliense</u>, except that it does not extend as far outside the tropical regions. In the <u>Carnegie</u> collection in the Atlantic there is only one station outside the warm Atlantic region, station 13a. In the <u>Pacific it has about the same distribution as <u>C. massiliense</u> in the north, but was not well represented in the southeastern part of the <u>Pacific (chart 40)</u>. Nielsen (1934) found it in the <u>Pacific from Panama to Australia</u>, and <u>Peters (1934) found it widely distributed in the warm water of the South Atlantic.</u></u>

The total number of <u>Carnegie</u> stations at which it was found, was 111, 12 of which were in the Atlantic and 99 in the Pacific. The total number of sample records for the species was 281, with 138 rare, 124 occasional, and 19 common. The net records numbered 219; the pump records, 62.

The range of environmental conditions in which the species was found was similar to that of <u>C. massiliense</u>, though somewhat more restricted. The surface temperatures at its record stations in the Atlantic ranged from 21.2 to 28.5 C and in the Pacific from 16.3 to 29.5 C. Of the 281 records, 98 were from water containing less than 10 mg PO<sub>4</sub>/m<sup>3</sup>. The complete ranges of environmental conditions in situ were: temperature, 12.5 to 29.4 C; salinity, 29.7 to 35.9 per mille; pH, 7.82 to 8.47; phosphate, 3 to 153 mg PO<sub>4</sub>/m<sup>3</sup>.

<u>Ceratium carriense</u> is a surface species (Nielsen, 1934). In the <u>Carnegie</u> collection it was found with decreasing frequency with increase in depth (table 42).

Table 42. Records of occurrence of C. carriense at three levels

| Occum      | Depth in meters |      |    |      |     |           |  |
|------------|-----------------|------|----|------|-----|-----------|--|
| Occur-     | 0               |      | 50 |      | 100 |           |  |
| rence      | A               | В    | A  | В    | A   | В         |  |
| Rare       | 58              | 13.5 | 47 | 14.4 | 33  | 12.0      |  |
| Occasional | 51              | 13.0 | 43 | 14.2 | 30  | 11.9      |  |
| Common     | 13              | 3.4  | 6  | 2.2  | 0   | • • • • • |  |
| Total      | 122             | 29.9 | 96 | 30.8 | 63  | 23.9      |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

50. Ceratium contrarium (Gourret) Pavillard Figures 22E, 24A-B, chart 41, appendix table 46

This species is rather distinctive, and fairly constant in its body shape and origin of horns. There is one variation of the species, however, which has club-shaped ends on the antapical horns, var. claviceps Schröder (fig. 24B). In this variant the apical horn also may be expanded, but only gradually toward the tip. It was found rather

frequently in both the Atlantic and Pacific. It apparently does not represent a response to shade conditions, as it was found frequently at the surface.

The species as a whole is one of the most common of the genus. Peters (1934) found it commonly in the South Atlantic to about 33° south latitude generally and to almost 40° south, south of the Cape of Good Hope. Nielsen found it at all oceanic stations in the South Pacific with surface temperatures over 19° C. In the Carnegie collection it occurred at almost all the stations in the warm Atlantic region, warm Pacific, and southeast Pacific region as well as at one station in the cold North Pacific region (chart 41). The total number of station records was 138, of which 20 were in the Atlantic and 118 in the Pacific. The total number of sample records was 467, of which 167 were rare, 172 occasional, and 128 common. The net records numbered 298; the pump records, 169.

The distribution of the species at <u>Carnegie</u> stations indicated a greater tolerance for lower temperatures in the Pacific than in the Atlantic. In the Atlantic it did not occur in the North Atlantic Drift but stopped abruptly at the 20° isotherm. In the Pacific, on the other hand, it occurred to surface temperatures of 16.4 off the United States, and 15° C at 40° south in the southeastern Pacific. It showed no regard for the nutrient content of the water, being found as much in oligotrophic as eutrophic water. Of the 467 records of occurrence, 154 were in water containing less than 10 mg PO4/m³. The environmental conditions in situ were as follows: temperature, 10.2 to 29.5 C; salinity, 30.7 to 37.1 per mille; pH, 7.76 to 8.47; phosphate, 2 to 178 mg PO4/m³.

Ceratium contrarium is a surface species. Nielsen (1934) always found it more common in the 50- to 0-meter samples than in the deeper samples. In the <u>Carnegie</u> collection it was found with decreasing frequency with increase in depth (table 43). For example, it was found in 57.2 per cent of the surface samples, but only 37.4 per cent of the 100-meter samples.

Table 43. Records of occurrence of C. contrarium at three levels

| Occur-                       | Depth in meters |                      |                |                      |                |                      |  |  |
|------------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------------|--|--|
| rence                        | 0               |                      | 50             |                      | 100            |                      |  |  |
| rence                        | A               | В                    | A              | В                    | A              | В                    |  |  |
| Rare<br>Occasional<br>Common | 80<br>83<br>58  | 20.8<br>21.5<br>15.1 | 50<br>60<br>41 | 17.4<br>21.3<br>14.5 | 37<br>29<br>29 | 14.6<br>11.4<br>11.4 |  |  |
| Total                        | 221             | 57.4                 | 151            | 53.2                 | 95             | 37.4                 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

Ceratium trichoceros (Ehrenberg) Kofoid
 Figure 22B, chart 42, appendix table 47

This is a widespread intolerant tropical species characterized by widespread horns which lie parallel in their distal parts. It is fairly constant in its shape, although Nielsen (1934) has noted a tendency for an increase in diameter in colder or neritic waters.

In the <u>Carnegie</u> collection the species was found widely distributed in the warm regions, although not so commonly as such species as <u>C. massiliense</u>. <u>Ceratium</u>

trichoceros occurred at eighty-six stations--fourteen in the Atlantic and seventy-two in the Pacific. The total number of sample records for the species was only 181, of which 89 were rare, 67 occasional, 24 common, and 1 abundant. The net records numbered 118; the pump records, 63. Peters (1934) found it widespread in the warm South Atlantic but principally in his region I and along the west coast of Africa. Nielsen (1934) found it throughout the region from Panama to Australia.

According to the <u>Carnegie</u> distribution this is a rather strictly tropical species. In the Atlantic it was confined to the warm Atlantic region, with surface temperatures from 21.°2 to 28.°5 C. In the Pacific it was confined to the warm Pacific region and the southeast Pacific region. The total range of surface temperatures in the Pacific was from 19.°0 to 29.°5 C. The total ranges of environmental conditions in situ were: temperature, 14.°0 to 29.°4 C; salinity, 31.7 to 37.1 per mille; pH, 7.82 to 8.47; phosphate, 2 to 159 mg PO4/m³.

The <u>Carnegie</u> data do not show any preference on the part of this species for any particular type of water within the warm-water regions. It does not shun oligotrophic water. Of the 181 records of occurrence, 63 were from water containing less than 10 mg PO4/m<sup>3</sup>.

It is uncertain at what depth this species normally lives most abundantly. Nielsen (1934) stated that it was always more abundant in his 50- to 0-meter samples. In the <u>Carnegie</u> collection, however, there were more records for 100 meters than for the upper levels, with the fewest records for the surface (see table 44).

Table 44. Records of occurrence of C. trichoceros at three levels

| Occur-     | Depth in meters |      |    |      |     |      |  |  |
|------------|-----------------|------|----|------|-----|------|--|--|
| rence      |                 | 0    | 50 |      | 100 |      |  |  |
| rence      | A               | В    | A  | В    | A   | В    |  |  |
| Rare       | 28              | 7.3  | 23 | 8.1  | 38  | 15.0 |  |  |
| Occasional | 20              | 5.2  | 23 | 8.1  | 24  | 9.5  |  |  |
| Common     | 8               | 2.1  | 10 | 3.6  | 6   | 2.4  |  |  |
| Abundant   | 1               | 0.3  | 0  |      | 0   |      |  |  |
| Total      | 57              | 14.9 | 56 | 19.8 | 68  | 26.9 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

52. Ceratium vultur Cleve Figures 23A-H, chart 43, appendix table 48

The species as here considered includes <u>C. sumatranum</u> (Karsten) Jörgensen and <u>C. pavillardii</u> Jörgensen. <u>Ceratium vultur</u> is a variable species with many variable characters giving rise to what seem, at times, separate species. The study of the extensive material of the <u>Carnegie</u> collections, however, convinced the authors that these are variants of a single large species. The intergrades between them are numerous. Peters (1934) and Nielsen (1934) have already considered <u>C. vultur</u> and <u>C. sumatranum</u> as a single species, with <u>sumatranum</u> a variety of the former. In our material it was possible to distinguish seven different varieties as follows.

Variety <u>vultur</u> (Cleve) is stout and long-horned (fig. 23H). The right antapical ascends moderately; the left antapical extends posteriorly less than 0.5 girdle width before turning anteriorly.

Variety japonicum (Schröder) is as above, except that

the left antapical extends posteriorly more than 0.5 girdle width before turning anteriorly (figs. 23E-F).

Variety <u>sumatranum</u> (Karsten). The right antapical extends more or less laterally. The left antapical extends posteriorly a varying distance before turning anteriorly (fig. 23D).

Variety <u>pavillardii</u> (Jörgensen). The right antapical is as in var. <u>sumatranum</u>. The left antapical is kinked at the origin, and turns abruptly to the anterior (fig. 23C).

Variety <u>regulare</u> n. var. The right antapical extends laterally at the base but turns anteriorly. The left antapical does not extend posteriorly, but laterally, before turning anteriorly. In this respect it resembles <u>C. massiliense</u> (fig. 23G).

Variety <u>reversum</u> n. var. The right antapical is kinked at the origin and turns abruptly to the anterior. The left antapical extends somewhat posteriorly before turning anteriorly. The curvature of the antapical horns, then, is the reverse of that in var. <u>pavillardii</u> (fig. 23B).

Variety <u>recurvum</u> Jörgensen. The right antapical begins laterally, then at about half its length turns posteriorly. The left antapical begins posteriorly, turns laterally, and then posteriorly (fig. 23A).

Most of these varieties had the same distribution in both the tropical Atlantic and Pacific oceans. Varieties regulare and reversum, however, were confined to the Pacific, whereas var. recurvum was common in the North Equatorial Current of the Atlantic but occurred at only two stations in the entire Pacific, stations 98 and 149.

The species as a whole is intolerant tropical and confined to regions of warm water. Peters (1934) found C. yultur to be confined to warm, definitely oligotrophic water. Nielsen (1934) found it in the Panama region and the South Equatorial Current. In the Carnegie collection in the Atlantic it was confined to the warm Atlantic region, with surface temperatures ranging from 20.°5 to 28.°5 C. It was found at all stations in this region except one (chart 43). In the Pacific it was confined to the warm Pacific and southeast Pacific regions. The surface temperatures at the Pacific stations varied from 19.°4 (station 66 in the southeast Pacific) to 29.°4 C. The ranges of environmental conditions in situ were: temperature, 19.°8 to 29.°3 C; salinity, 29.7 to 37.1 per mille; pH, 7.76 to 8.42; phosphate, 2 to 189 mg PO4/m³.

It occurred at ninety-nine stations--twenty-four in the Atlantic and seventy-five in the Pacific. There were 251 records of occurrence, with 168 rare, 71 occasional, and 12 common. Of these, 203 were net records and 48 were pump records.

Nielsen (1934) found both the main species and var. sumatranum to be shade species. The <u>Carnegie</u> data substantiate these findings in that they show an increasing frequency with increase in depth (table 45).

Table 45. Records of occurrence of C. vultur at three levels

| Occur-                       | Depth in meters |                    |               |                    |               |                    |  |  |
|------------------------------|-----------------|--------------------|---------------|--------------------|---------------|--------------------|--|--|
| rence                        | 0               |                    | 5             | 50                 | 100           |                    |  |  |
| Tence                        | A               | В                  | A             | В                  | A             | В                  |  |  |
| Rare<br>Occasional<br>Common | 58<br>27<br>8   | 15.1<br>7.1<br>2.1 | 59<br>21<br>1 | 20.1<br>7.5<br>0.4 | 51<br>23<br>3 | 20.1<br>9.1<br>1.2 |  |  |
| Total                        | 93              | 24.3               | 81            | 28.0               | 77            | 30.4               |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

53. Ceratium horridum Gran Figures 23I-L, 24C-I, 25A-G, chart 44, appendix table 49

This species comprises a variable and uncertain group of the genus. The authors cannot agree with Jörgensen (1920), however, who combines this group with C. tenue. Peters (1934) followed Jörgensen's classification but did not name or figure any of the forms of the inclusive species. Paulsen (1930) and Nielsen (1934), on the other hand, separated C. horridum from C. tenue, as the authors have done in the present report. The two species can be separated on the basis of body shape and curvature of horns and also, in part, on the basis of size. The different shapes can be seen by reference to figures 23 to 26. Ceratium horridum is larger than C. tenue, having an average diameter of 44 microns as compared with 37 microns for C. tenue. The extremes, however, overlap, with a minimum of 30 microns for C. horridum and a maximum of 45 microns for C. tenue.

<u>Ceratium horridum</u> is made up of a number of variable units; formerly separated as <u>C. horridum</u> (<u>C. intermedium</u>), <u>C. molle</u>, and <u>C. claviger</u>. Nielsen (1934) still considered <u>C. claviger</u> a species distinct from <u>C. molle</u>, but in the <u>Carnegie</u> collection no evidence for this separation was found. It seems best, therefore, to treat these forms as varieties.

Variety molle and var. claviger are tropical forms, whereas var. horridum is more or less cosmopolitan. It is probable that there are northern and tropical forms of var. horridum which overlap in such a way that they are not distinguishable. In any event, a certain difference can be discerned between the cold- and warm-water forms. In figures 24D and G are two specimens representative of the cold-water form of the North Atlantic; figure 24H shows a specimen from the warm Gulf Stream or North Atlantic West Wind Drift. Peters (1934) found the inclusive species widespread over the South Atlantic, as did Nielsen (1934) in the South Pacific.

The Pacific material is similar to that of the Atlantic, at least in part. The variety in the Panama region, for instance, (fig. 24E) is similar to the Gulf Stream form. The Galapagos form (fig. 25B), on the other hand, rather closely resembles the cold-water form of the North Atlantic. In the cool water of the southeast Pacific the variety was more robust and long-horned (fig. 25E). In the Humboldt Current the variety was even more robust and the horns were more extended (fig. 25F). In the warm equatorial waters it was slender and long-horned (fig. 24C). In the cold waters of the cold North Pacific region it was found only at three stations off the west coast of North America, stations 126 to 128, and at one station off Japan, station 114 (figs. 24I, 25A). At these stations the variety did not resemble the cold-water form of the North Atlantic. It was slender and long-horned, resembling much more the equatorial form of the Pacific (figs. 24C, 25G). It was, however, much more spiny. The surface temperatures at the eastern stations varied from 11.2 to 16.4 C and at the station off Japan it was 19.9 C. The differences between the forms of var. horridum in the northern Atlantic and northern Pacific is another indication of the isolation of the northern Pacific waters. Its absence in the most northern (coldest) stations in this region, however, may be owing to the temperatures, which were mostly less than  $10\,^\circ$  C. This was lower than the temperatures of the northern Atlantic where the variety occurred.

Variety <u>molle</u> is similar to var. <u>horridum</u> but is confined to the warm regions. Its occurrence in the <u>Carnegie</u> collection was sporadic. Its most northern position in the Atlantic was at station 3 (see fig. 25D). Here it was rather robust but had the typical long horns. In the warmer stations it was more slender and delicate (see fig. 23I). The Pacific form of var. <u>molle</u> was quite similar to that of the Atlantic (see fig. 23K).

Frequently varieties were found which were difficult for the authors to assign to either <u>molle</u> or <u>horridum</u>. Figures 25C and G show two such. In a sense these are intergrades between the two varieties, but figure 25G shows a specimen with extremely long and attenutated antapical horns. Specimens such as this have been partly responsible, perhaps, for the opinion that <u>C. horridum</u> and <u>C. tenue</u> are part of the same species complex. It is not likely, however, that this represents an intergrade, as the origin of the horns and proximal curvatures are different from those of <u>C. tenue</u> (cf. figs. 26C-D).

Among recent workers, Nielsen (1934) is the only one who considered <u>C. claviger</u> Kofoid a separate species. This opinion probably is owing to a lack of sufficient material, as it is plain from the <u>Carnegie</u> material that this form is characterized only by the swollen ends of the antapical horns. The body shape and origins of horns may be that of var. <u>horridum</u> or var. <u>molle</u> (see figs. 23], L).

The species as a whole is not very common. It was found at a total of eighty <u>Carnegie</u> stations—twenty-eight in the Atlantic and fifty-two in the Pacific. Since there are apparently cold—and warm—water varieties of the species, the ranges of temperatures for these stations are not very significant. In the Atlantic the surface temperatures at the record stations varied from 8.9 to 28.5 C and in the Pacific from 11.2 to 29.4 C. The environmental conditions in situ were as follows: temperature, 6.3 to 29.3 C; salinity, 31.7 to 36.8 per mille; pH, 7.68 to 8.39; phosphate, 4 to 233 mg PO4/m³.

The total number of sample records for the species was only 149, of which 96 were rare, 38 occasional, 11 common, and 4 abundant. The net records numbered 96; the pump records, 53.

<u>Ceratium horridum</u> is not a species of oligotrophic water. Although it was found in some "barren" regions, it occurred predominantly in richer waters. Only 16 of the 149 records were in water containing less than 10 mg  $PO_4/m^3$ .

The species is a decided shade form. In the coldwater region of the North Atlantic it was found about equally at the three levels, but elsewhere it was found much more frequently at greater depths, particularly at 100 meters. The depth records for the species throughout

Table 46. Records of occurrence of C. horridum at three levels

| Occur-     | Depth in meters |      |    |      |     |      |  |  |  |
|------------|-----------------|------|----|------|-----|------|--|--|--|
| rence      | 0               |      |    | 50   | 100 |      |  |  |  |
| rence      | A               | В    | A  | В    | A   | В    |  |  |  |
| Rare       | 31              | 8.1  | 32 | 11.4 | 33  | 13.0 |  |  |  |
| Occasional | 12              | 3.1  | 14 | 4.9  | 12  | 4.7  |  |  |  |
| Common     | 1               | 0.3  | 3  | 1.1  | 7   | 2.8  |  |  |  |
| Abundant   | 3               | 0.8  | 1  | 0.3  | . 0 |      |  |  |  |
| Total      | 47              | 12.3 | 50 | 17.7 | 52  | 20.5 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

its entire range show an increase in frequency with an increase in depth (table 46).

54. Ceratium tenue Ostenfeld and Schmidt Figures 26C-D, chart 45, appendix table 50

Two varieties of this species can be recognized: var. <u>inclinatum</u>, in which the antapical horns are directed more or less apically (fig. 26C); and var. <u>tenuissimum</u>, in which the antapical horns are directed laterally (fig. 26D). It is important to note that the origin and proximal curvatures of the antapicals in these varieties are the same, the differences being due to curvatures more than one-half girdle diameter from the body.

The two varieties do not have separate ranges of distribution but are found together in the warm regions of the world. The species as a whole is more common than <u>C</u>. horridum, but does not have any cold-water representative.

Peters (1934) apparently included this form in <u>C.</u>
<a href="https://doi.org/10.00/1

The total number of station records for the species in the <u>Carnegie</u> collection was 100--19 of these were in the Atlantic and 81 were in the Pacific. The Atlantic records were all restricted to the warm Atlantic region, with surface temperatures from 21.°2 to 28.°5 C. The Pacific stations were in the warm Pacific region and the southeast Pacific region, except for one station off California which extended into the cold Pacific region (station 128, surface temperature 16.°4 C). Throughout its range the species was found fairly uniformly except off Peru and the Panama and Galapagos areas, where it seldom occurred.

The total number of sample records for the species was 236, of which 129 were rare, 99 occasional, and 8 common. The net records numbered 115; the pump records, 121. The environmental conditions in situ were as follows: temperature, 8.8 to (29.4) C; salinity, 33.2 to 37.1 per mille; pH, 7.93 to 8.39; phosphate, 2 to 176 mg  $PO_4/m^3$ .

<u>Ceratium tenue</u> is definitely a shade species. In the <u>Carnegie</u> collection it was found with increasing frequency with increase in depth. There were almost four times as many records for 100 meters as for the surface (table 47). Nielsen (1934) also found the species to be a shade form in the Pacific.

Table 47. Records of occurrence of C. tenue at three levels

| Occur-               |         | Depth in meters |         |                    |         |             |  |  |  |  |
|----------------------|---------|-----------------|---------|--------------------|---------|-------------|--|--|--|--|
| rence                |         | 0               | 5       | 50                 | 100     |             |  |  |  |  |
| rence                | A       | В               | A       | В                  | A       | В           |  |  |  |  |
| Rare                 | 29      | 7.3             | 43      | 14.2               | 57      | 20.9        |  |  |  |  |
| Occasional<br>Common | 14<br>1 | 3.6<br>0.3      | 35<br>1 | $\frac{12.1}{0.4}$ | 50<br>6 | 18.9<br>2.4 |  |  |  |  |
| Total                | 44      | 11.2            | 79      | 26.7               | 113     | 42.2        |  |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

55. Ceratium longissimum (Schröder) Kofoid Figures 26A-B, chart 46, appendix table 51

This is a rare intolerant tropical species. It is not variable in form and for this reason it is interesting to note a constant difference in the spread of the horns between the Atlantic and Pacific specimens. In the Atlantic form (fig. 26A) the three horns are practically parallel, whereas in the Pacific form (fig. 26B) the antapicals, although proximally almost parallel in position, soon diverge considerably from the apical horn. Also, the horns in the Pacific form are much more slender.

The species was found at twenty-eight stations--five in the Atlantic and twenty-three in the Pacific. The Atlantic stations were all in the warm Atlantic region, with surface temperatures above 20° C. The Pacific stations were in the warm Pacific and southeast Pacific regions with surface temperatures above 21° C. There was a particular concentration of stations in the general area between Hawaii and North America. The distribution as a whole was closely restricted as to latitude, lying between latitudes 14° south and 34° north. Nielsen's (1934) records, which were the first for the Pacific, lie within these limits except for one station in Australian waters at latitude 32° south. The temperature there, however, was above 20° C. In the Atlantic the northern limit was somewhat farther north than in the Pacific, namely, 38.°5 north.

The rarity of the species is further shown by the number of sample records, which was thirty-two. Of these, twenty-five were rare and seven occasional. Only six were pump records; twenty-six were net records. The species may prefer oligotrophic water as it was seldom found in regions rich in plankton and fifteen of the thirty-two records of occurrence were in water containing less than 10 mg PO4/m³. The ranges of environmental conditions in situ were: temperature, 12.°3 to 28.°0 C; salinity, 34.3 to 36.4 per mille; pH, 7.92 to 8.39; phosphate, 3 to 138 mg PO4/m³.

Ceratium longissimum is one of the most pronounced shade species encountered. Of the thirty-two records of occurrence, none were for the surface, only five for 50 meters, and twenty-seven for 100 meters (see table 48). Nielsen (1934) found it only in the samples taken from 200 to 100 meters and 100 to 50 meters.

Table 48. Records of occurrence of C. longissimum at three levels

| Occur-             | Depth in meters |         |        |     |         |            |  |  |  |
|--------------------|-----------------|---------|--------|-----|---------|------------|--|--|--|
| rence              | 0               |         | 50     |     | 100     |            |  |  |  |
|                    | A               | В       | A      | В   | A       | В          |  |  |  |
| Rare<br>Occasional | 0               | 0.0 0 0 | 5<br>0 | 1.8 | 20<br>7 | 7.8<br>2.8 |  |  |  |
| Total              | 0               |         | 5      | 1.8 | 27      | 10.6       |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

56. Ceratium arcticum (Ehrenberg) Cleve Figures 26E-H, 27A-E, chart 47, appendix table 52

<u>Ceratium longipes</u> (Bailey) Gran and <u>C. arcticum</u> (Ehr.) Cleve intergrade in such a way that the authors are forced to include them under a single species. According

to the international rules of botanical nomenclature the name for this inclusive species must be <u>C. arcticum</u>, as it was used as a specific name earlier than <u>C. longipes</u> (see Jörgensen, 1911, pp. 84-85). The <u>longipes</u> form, however, is sufficiently distinct to be separated as avariety. Variety <u>ventricosum</u> Ostenfeld is a robust, heavily armored form, with swollen body (fig. 26E). It is apparently limited to the northern Atlantic waters. In the <u>Carnegie</u> collection it occurred only in the cold Atlantic region, with the single exception of station 14, where the surface temperature was 21.°2. At the other record stations the temperatures were under 11° C.

Variety arcticum probably is more characteristic of colder water than is longipes, although not so much so as the name would indicate. Variety longipes is found more frequently over a wider range than var. arcticum, but the latter strays far from its northern home. Cleve (1900) found it as far south as the Azores and the Straits of Gibralter. In the Carnegie collection it was found as far south as 20° north in the central Atlantic (station 20) and at one station in the Caribbean (station 33). never found at the surface in these warm regions, however, although the temperatures in situ were quite high; namely, 25.8 C at station 20 and 28.2 C at station 33. This is a curious distribution for a species of Ceratium. Its center of abundance unquestionably is in the cold waters where the temperatures are less than 10° C at the surface in the summer; yet isolated specimens find their way into the heart of the tropics.

Apparently a similar situation exists in the North Pacific. The main distribution of <u>arcticum</u> is to the north in cold water (<u>Carnegie</u> stations 120 to 121, surface temperatures less than 8°C), yet a specimen was found at station 146 between Hawaii and the United States, where the surface temperature was 22°4 C. To be sure, the record was for the 100-meter sample, but even here the temperature was 19°7 C.

Variety <u>longipes</u>, on the other hand, although it occurs abundantly over a wider range than var. <u>arcticum</u>, is not found so far from its centers of abundance as var. arcticum.

The inclusive species was found at a total of thirtyone stations, of which twenty-one were in the Atlantic
and ten in the Pacific. The total number of sample records was eighty-four, with thirty-seven rare, twentyseven occasional, eleven common, and nine abundant.
Net samples predominated with fifty-nine records, as
compared with twenty-five pump sample records.

The total ranges of environmental conditions in situ were: temperature, -1.2 to 28.2 C; salinity, 32.7 to 37.1 per mille; pH, 7.64 to 8.29; phosphate, 3 to 228 mg PO4/m<sup>3</sup>.

No one has reported anything regarding the depth at which the species normally lives since Nielsen (1934) did not find the species. The <u>Carnegie</u> records (table 49) show an increase in frequency with increase in depth to 100 meters. The increase is not great, however, with the species occurring in 8.1 per cent of the surface samples and 10.6 per cent of the 100-meter samples. Is it possible that <u>C. arcticum</u>, which is characteristic of arctic waters, is a shade species adapted for life under the polar ice cap where the intensity of illumination cannot be great? The <u>Carnegie</u> data alone cannot be conclusive regarding the vertical distribution of this species. Many of the station records are from cold northern waters where the plankton in the upper layers is comparatively dense so there is much greater chance of contamination

of the open nets during hauling in. On the other hand, it should be noted that the records for the species in the warm oligotrophic water of the Atlantic are predominantly subsurface records. This occurrence may be owing to the lower temperatures obtaining there rather than to the preference for, or superior survival in, levels of weak illumination so the species may not be a shade species in the true sense of the term.

Table 49. Records of occurrence of C. arcticum at three levels

| Occur-     | Depth in meters |     |    |     |     |      |  |  |
|------------|-----------------|-----|----|-----|-----|------|--|--|
| rence      | 0               |     | 50 |     | 100 |      |  |  |
| rence      | A               | В   | A  | В   | Α   | В    |  |  |
| Rare       | 7               | 1.8 | 14 | 5.0 | 16  | 6.3  |  |  |
| Occasional | 12              | 3.2 | 7  | 2.5 | 8   | 3.2  |  |  |
| Common     | 6               | 1.6 | 4  | 1.4 | 1   | 0.4  |  |  |
| Abundant   | 6               | 1.6 | 1  | 0.4 | 2   | 8.0  |  |  |
| Total      | 31              | 8.2 | 26 | 9.3 | 27  | 10.7 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

57. Ceratium hexacanthum Gourret Figures 27F-G, chart 48, appendix table 53

This is a common, very tolerant tropical species. The antapical horns tend to be extremely thin and attenuated, and to curl so that various modifications of these horns occur. There seems to be no justification for creating varieties such as var. <a href="mailto:spiralis">spiralis</a> Kofold, on the basis of such characters as the curl of the horns.

In the Pacific the species was confined to the warm tropical waters. The surface temperatures at the Pacific record stations were all above 20° except at two stations in the southeastern Pacific (stations 57 and 62), where the surface temperatures were 19.0 and 19.2 C. In the Atlantic, on the other hand, the species is apparently carried by the North Atlantic Drift to the British Isles and as far as Iceland (see chart 48) into water with surface temperatures as low as 8.9 C. Morpholgically no separation could be made between the Atlantic and Pacific forms. The form carried into the cold waters of the North Atlantic, however, probably is a particular subspecies, at present indistinguishable from the tropical form because the tropical form does not invade cold water elsewhere. Peters (1934) stated that it was noticeably absent from the South Atlantic south of about 33° south. It dropped out at about this latitude at the Carnegie stations in the southeastern Pacific, and at the Dana stations in the southeastern Pacific (Nielsen, 1934). Thus, it kept within the 20° isotherm in the North Pacific, which indicates that the race of the Pacific is at least physiologically different from that in the North Atlantic.

The ranges of environmental conditions in situ for the species as a whole were: temperature, 8.2 to 29.3 C; salinity, 30.7 to 37.1 per mille; pH, 7.17 to 8.47; phosphate, 2 to 198 mg PO<sub>4</sub>/m<sup>3</sup>.

The total number of station records was 124--28 in the Atlantic and 96 in the Pacific. There were 327 records of occurrence, of which 169 were rare, 129 occasional, and 29 common. The net records numbered 267; the pump records, 60.

Nielsen (1934) classified C. hexacanthum as a shade

species. He found that in the eastern part of the South Pacific, where there were stations rich in plankton, the species had its main distribution above 50 meters; at the western stations, where the plankton population was less dense, the species had its main distribution below 50 meters. The Carnegie data do not, however, substantiate these results. The number of records in the Carnegie collection decreased with increase in depth. Perhaps, if a classification of the Carnegie tropical stations as to plankton content could be made, some correlation with plankton density could be discovered. The authors can conclude that C. hexacanthum, however, is not a typical shade species as many other species in the Carnegie collection showed a decided increase in frequency of occurrence with increase in depth, considering the collection as a whole.

Table 50. Records of occurrence of C. hexacanthum at three levels

| Occur-     |     | Depth in meters |     |      |     |      |  |  |  |
|------------|-----|-----------------|-----|------|-----|------|--|--|--|
| rence      | 0   |                 | 50  |      | 100 |      |  |  |  |
| 201100     | A   | В               | A   | В    | A   | В    |  |  |  |
| Rare       | 72  | 18.2            | 53  | 17.9 | 44  | 17.3 |  |  |  |
| Occasional | 63  | 16.3            | 43  | 15.2 | 23  | 9.1  |  |  |  |
| Common     | 13  | 3.4             | 9   | 3.2  | 7   | 2.7  |  |  |  |
| Total      | 148 | 37.9            | 105 | 36.3 | 74  | 29.1 |  |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

58. Ceratium reflexum Cleve Figure 27, chart 49, appendix table 54

This is a very rare, intolerant tropical species. It was not reported from the South Atlantic by Peters (1934) although it had been reported from as far south as 19.5

south latitude in the Atlantic by Cleve (1900). Nielsen (1934) found it at only four stations in the South Pacific.

In the Carnegie collection it occurred at twenty-one stations--six in the Atlantic and fifteen in the Pacific. The Atlantic stations were between 11° and 24° north latitude. The Pacific stations were much scattered (see chart 49). The range of surface temperatures at the record stations for the species was from 23.°4 to 29.°4 C. The ranges of environmental conditions in situ were: temperature, 17.°5 to 28.°6 C; salinity, 34.4 to 37.1 per mille; pH, 7.99 to 8.39; phosphate, 3 to 123 mg PO<sub>4</sub>/m<sup>3</sup>.

The total number of sample records was thirty-nine, of which thirty-three were rare, five occasional, and one common. The record of common was at station 105 near Guam; the occasional records were from station 20 (tropical Atlantic), station 97 (near the Phoenix Islands), and station 107 (near Guam). The species perhaps prefers oligotrophic water since twenty-three of the thirty-nine records were in water containing less than 10 mg PO4/m<sup>3</sup>.

It is probably a shade species. Practically all Nielson's (1934) records were from the deeper layers. The <u>Carnegie</u> data show an increase in frequency with increase in depth (table 51).

Table 51. Records of occurrence of C. reflexum at three levels

| Occur-<br>rence      |    | Depth in meters |    |     |    |     |     |  |  |
|----------------------|----|-----------------|----|-----|----|-----|-----|--|--|
|                      | 0  |                 | 50 |     |    | 100 |     |  |  |
|                      | A  | В               | A  | В   |    | A   | В   |  |  |
| Rare                 | 8  | 2.1             | 13 | 4.6 |    | 12  | 4.7 |  |  |
| Occasional<br>Common | ρ  | 0.0             | 1  | 0.4 |    | 0   | 1.2 |  |  |
| Total                | 10 | 2.7             | 14 | 5.0 | 3h | 15  | 5.9 |  |  |

A=Number of records. B=Per cent of total number of samples collected at that depth.

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## APPENDIX TABLES 1 - 54

## TABLES OF DISTRIBUTIONAL AND ENVIRONMENTAL RECORDS

## Abbreviations and Numerical Equivalents Used in Tables

### For Relative Abundance

a (abundant) indicates over 50 individuals oc (occasional) from 11 to 25 individuals

c (common) from 25 to 50 individuals r (rare) from 6 to 10 individuals

## For Apparatus

n = sample taken by net p = sample taken by pump

Values enclosed in parentheses are interpolated



Table 1. Distributional and environmental records for Ceratium praelongum

| Station   Sample   Depth   Relative   Appa   Date   Temperature   Salinive   pH   POM mg/m3   |
|---|
| 1b 7 50 r n 8/11/28 19.8 36.3 8.21 38) 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 104 50 r n 8/13/28 19.9 36.5 8.21 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 19 121 50 r n 8/13/28 19.9 36.5 8.17 13 31 191 0 r n 10/3/28 28.5 34.4 8.23 28 47 267 50 r n 11/23/28 28.5 34.4 8.27 2 33 198A 50 r p 10/8/28 28.2 36.2 8.24 4 47 267 50 r n 11/23/28 23.8 36.0 8.23 20 47 268 100 r n 11/23/28 23.8 36.0 8.23 20 47 269 0 r n 11/23/28 23.8 36.0 8.23 20 48 273 100 r n 11/23/28 22.7 36.2 8.24 14 49 278 50 r n 11/25/28 22.7 36.3 8.26 16 55 327 50 r p 12/16/28 18.7 35.0 8.26 16 56 329 50 r n 12/18/28 18.5 35.1 8.14 9 56 330 100 r n 12/18/28 18.5 35.1 8.14 19 56 330 100 r n 12/18/28 18.5 35.1 8.14 19 69 424 0 r n 12/18/28 18.5 35.1 8.14 19 69 424 0 r n 12/18/28 18.5 35.1 8.14 19 69 424 0 r n 12/18/28 18.5 35.1 8.14 19 69 424 0 r n 12/18/28 18.5 35.1 8.14 19 69 424 0 r n 12/18/28 18.5 35.1 8.14 19 69 424 0 r n 12/18/28 18.5 35.1 8.14 19 69 427 0 r n 2/26/29 22.1 35.9 8.14 62 776 471 50 r p 2/16/29 22.1 35.9 8.14 62 777 472 50 r r n 2/26/29 22.1 35.9 8.14 62 777 472 50 r r n 2/26/29 22.5 35.8 8.19 38 81 492 50 r n 2/26/29 28.5 35.8 8.19 38 81 492 50 r n 2/26/29 28.5 35.8 8.19 38 81 492 50 r n 2/26/29 28.5 35.8 8.19 38 81 492 50 r n 2/26/29 28.5 35.8 8.19 38 81 492 50 r n 2/26/29 28.5 35.8 8.19 38 81 492 50 r n 2/26/29 28.2 35.3 36.8 8.19 38 81 492 50 r n 2/26/29 28.2 35.3 36.8 8.19 38 81 492 50 r n 2/26/29 28.2 35.3 36.8 8.19 38 81 492 50 r n 2/26/29 28.2 35.3 36.8 8.19 38 81 492 50 r n 2/26/29 28.2 35.3 36.8 8.19 38 81 492 50 r n 5/4/29 27.6 35.3 36.8 8.22 12 99 591 500 c n 6/25/29 28.3 36.3 36.8 8.21 16 24 40 67 7 p 2/26/29 28.2 35.3 36.8 8.19 38 81 492 50 r n 7 p 2/26/29 28.2 35.3 36.8 8.19 38 81 493 60 50 r n 7 p 2/26/29 28.2 35.3 36.8 8.19 38 81 493 60 50 r n 7 p 2/26/29 28.2 35.3 36.8 8.22 12 99 591 500 c n 7 p 2/26/29 28.2 35.3 36.8 8.22 12 99 591 600 c n 7 p 4/26/29 29.2 35.3 38.8 36.9 38.2 12 100 602 100 r n 7 p 5/4/29 27.6 35.0 34.7 8.22 12 100 692 404 604 604 604 604 604 604 604 604 604   |
| 1b  |
| 16 102 100  |
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| 100 596 50 oc n 5/4/29 27.6 34.7 8.21 10 100 597 100 oc n 5/4/29 27.6 34.7 8.22 12 100 599 50 r p 5/4/29 27.6 34.7 8.21 10 100 602 100 r p 5/4/29 27.6 34.7 8.21 10 100 602 100 r p 5/4/29 27.6 34.7 8.22 12 101 604 50 r n 5/7/29 26.2 34.7 8.24 8 102 610 50 r n 5/9/29 25.8 35.0 8.24 8 102 611 100 r n 5/9/29 25.6 35.0 8.23 8 109 656 100 r n 5/29/29 19.4 34.8 8.18 5 112 675 50 oc n 6/5/29 21.7 34.6 8.23 7 113 681 50 r n 6/25/29 23.8 34.6 8.25 5 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 155 949 50 r p 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/27/29 14.2 34.5 7.87 53 154 958 0 r n 10/27/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/27/29 14.2 34.5 7.87 53 154 958 0 r n 10/27/29 28.3 34.9 8.39 7 155 966 50 r n 11/2/29 27.8 34.9 8.39 7 155 966 50 r n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.8 34.9 8.30 35 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 156 972 0 0c n 11/2/29 27.6 35.0 8.34 28   |
| 100 597 100 oc n 5/4/29 27.6 34.7 8.22 12 100 599 50 r p 5/4/29 27.6 34.7 8.21 10 100 602 100 r p 5/4/29 27.6 34.7 8.21 10 100 602 100 r p 5/4/29 27.6 34.7 8.22 12 101 604 50 r n 5/7/29 26.2 34.7 8.24 8 102 610 50 r n 5/9/29 25.8 35.0 8.24 8 102 611 100 r n 5/9/29 25.6 35.0 8.23 8 109 656 100 r n 5/29/29 19.4 34.8 8.18 5 112 675 50 oc n 6/5/29 21.7 34.6 8.23 7 113 681 50 r n 6/25/29 23.8 34.6 8.25 5 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 113 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/27/29 14.2 34.5 7.87 53 154 958 0 r n 10/27/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/29/29 28.1 34.2 8.39 7 155 966 50 r n 10/31/29 28.3 34.9 8.39 7 155 966 50 r n 11/2/29 27.8 34.9 8.39 7 155 966 50 r n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 155 967 100 oc n 11/2/29 27.6 35.0 8.30 35   |
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| 100 602 100 r p 5/4/29 27.6 34.7 8.22 12 101 604 50 r n 5/7/29 26.2 34.7 8.24 8 102 610 50 r n 5/9/29 25.8 35.0 8.24 8 102 611 100 r n 5/9/29 25.6 35.0 8.23 8 109 656 100 r n 5/29/29 19.4 34.8 8.18 5 112 675 50 oc n 6/5/29 21.7 34.6 8.23 7 113 681 50 r n 6/25/29 23.8 34.6 8.25 5 114 687 50 r p 6/25/29 23.8 34.6 8.25 5 115 684 50 r p 6/25/29 23.8 34.6 8.25 5 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/27/29 14.2 34.5 7.87 53 153 956 50 r p 10/27/29 14.2 34.5 7.87 53 153 956 50 r p 10/27/29 28.1 34.2 8.47 7 153 956 50 r n 10/27/29 28.1 34.2 8.47 7 153 956 50 r n 10/31/29 28.3 34.2 8.39 7 154 958 0 r n 10/31/29 28.3 34.9 8.39 7 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 156 972 0 0c n 11/2/29 27.6 35.0 8.34 28   |
| 102 610 50 r n 5/9/29 25.8 35.0 8.24 8 102 611 100 r n 5/9/29 25.6 35.0 8.23 8 109 656 100 r n 5/29/29 19.4 34.8 8.18 5 112 675 50 oc n 6/5/29 21.7 34.6 8.23 7 113 681 50 r n 6/25/29 23.8 34.6 8.25 5 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 113 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 132 803 100 r p 10/27/29 14.2 34.5 7.87 53 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/27/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 966 50 r n 10/31/29 27.8 34.9 8.39 30 155 966 50 r n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35  |
| 102 611 100 r n 5/9/29 25.6 35.0 8.23 8 109 656 100 r n 5/29/29 19.4 34.8 8.18 5 112 675 50 oc n 6/5/29 21.7 34.6 8.23 7 113 681 50 r n 6/25/29 23.8 34.6 8.25 5 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/27/29 14.2 34.5 7.87 53 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/31/29 28.3 34.2 8.39 7 154 958 0 r n 10/31/29 28.3 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.30 30 156 967 100 oc n 11/2/29 27.6 35.0 8.30 35 156 972 0 0c n 11/4/29 27.6 35.0 8.34 28   |
| 109 656 100 r n 5/29/29 19.4 34.8 8.18 5 112 675 50 oc n 6/5/29 21.7 34.6 8.23 7 113 681 50 r n 6/25/29 23.8 34.6 8.25 5 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/27/29 14.2 34.5 7.87 53 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r n 10/31/29 28.3 34.2 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 155 967 100 oc n 11/2/29 27.6 35.0 8.34 28   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |
| 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 155 967 100 oc n 11/2/29 27.6 35.0 8.30 35  |
| 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 132 803 100 r p 9/8/29 14.3 33.4 8.30 16 152 945 50 r n 10/27/29 14.2 34.5 7.87 53 152 949 50 r p 10/27/29 14.2 34.5 7.87 53 153 955 0 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 155 967 100 oc n 11/2/29 27.6 35.0 8.30 35  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |
| 152 945 50 r n 10/27/29 14.2 34.5 7.87 53<br>152 949 50 r p 10/27/29 14.2 34.5 7.87 53<br>153 955 0 r p 10/29/29 28.1 34.2 8.47 7<br>153 956 50 r p 10/29/29 28.1 34.4 8.39 7<br>154 958 0 r n 10/31/29 28.3 34.2 8.39 7<br>155 966 50 r n 11/2/29 27.8 34.9 8.29 29<br>155 966 50 r n 11/2/29 27.8 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.7 34.9 8.30 35<br>155 967 100 oc n 11/2/29 27.6 35.0 8.30 35  |
| 152 949 50 r p 10/27/29 14.2 34.5 7.87 53<br>153 955 0 r p 10/29/29 28.1 34.2 8.47 7<br>153 956 50 r p 10/29/29 28.1 34.4 8.39 7<br>154 958 0 r n 10/31/29 28.3 34.2 8.39 7<br>155 965 0 oc n 11/2/29 27.8 34.9 8.29 29<br>155 966 50 r n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.7 34.9 8.30 35<br>156 972 0 oc n 11/2/29 27.6 35.0 8.34 28   |
| 153 955 0 r p 10/29/29 28.1 34.2 8.47 7 153 956 50 r p 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35  |
| 153 956 50 r p 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.7 34.9 8.30 35 156 972 0 oc n 11/2/29 27.6 35.0 8.34 28  |
| 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28   |
| 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29<br>155 966 50 r n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.2 35.0 8.30 35<br>156 972 0 oc n 11/4/29 27.6 35.0 8.34 28  |
| 155 966 50 r n 11/2/29 27.7 34.9 3.50 35 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28  |
| 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28  |
| 156 972 U OC H 11/ 4/27 21.0 0.0 0.0 0.0 0.0  |
|   |
| 150 978 0 0C n 11/6/29 27.1 35.3 8.27 47  |
| 157 979 50 oc p 11/6/29 27.1 35.2 8.32 60   |
| 157 980 100 oc n 11/6/29 26.8 35.5 8.30 04  |
| 158 983 0 oc n 11/8/29 28.2 35.6 8.34 36  |
| 158 984 50 oc n 11/8/29 28.2 35.0 8.39 50   |
| 158 985 100 oc n 11/8/29 27.6 35.9 8.39 46  |
| 109 990 0 1 11/11/20 205 257 830 15   |
| 109 991 00 1 14/42/20 20 5 25 7 2 44 16   |
| 160 1003 100 r n 11/13/29 28.5 35.7 6.44 16   |

Table 2. Distributional and environmental records for Ceratium cephalotum

|            |            |              |                    |                |                      |                  | •                   |              |   |
|------------|------------|--------------|--------------------|----------------|----------------------|------------------|---------------------|--------------|---|
| Station    | Sample     | Depth<br>(m) | Relative abundance | Appa-<br>ratus |                      | Temperature (°C) | Salinity<br>(o/oo)  | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup>  |
| 1b         | 8          | 100          | r                  | n              | 5/16/28              | (20.3            | 36.5                | 8.18         | 36)   |
| 16         | 108        | 100          | r .                | n              | 8/13/28              | 19.9             | 36.5                | 8.17         | 13  |
| 48         | 273        | 100          | r                  | n              | 11/25/28             | 22.7             | 36.3                | 8.26         | 16  |
| 83         | 501        | 0            | r                  | n              | 3/ 2/29              | 27.5             | 36.3                | 8.24         | 29  |
| 89         | 529        | 50           | r                  | n              | 3/23/29              | 28.6             | 35.8                | 8.27         | 12  |
| 90         | 533        | 0            | r                  | n              | 3/25/29              | 28.5             | 35.5                | 8.27         | 21  |
| 90         | 534        | 50           | oc                 | n              | 3/25/29              | 28.6             | 35.6                | 8.26         | 21  |
| 91         | 540        | 0            | oc                 | n              | 3/27/29              | 28.7             | 35.1<br>35.2        | 8.30         | 21<br>24  |
| 91<br>92   | 541<br>545 | 50<br>0      | oc                 | n              | 3/27/29<br>3/29/29   | 28.5<br>28.5     | 35.3                | 8.30         | 28  |
| 93         | 551        | 50           | r                  | n              | 3/29/29              | 28.5             | 34.8                | 8.30         | 28  |
| 95         | 563        | 50           | r                  | n<br>n         | 4/24/29              | 29.3             | 34.9                | 8.24         | 16  |
| 96         | 569        | 50           | r                  | n              | 4/26/29              | 29.2             | 35.3                | 8.23         | 12  |
| 101        | 605        | 100          | r                  | n              | 5/7/29               | 25.2             | 35.1                | 8.23         | 8   |
| 103        | 615        | 0            | · r                | n              | 5/11/29              | 26.0             | 35.0                | 8.25         | 8<br>5<br>5<br>5<br>7<br>5<br>4<br>5<br>5<br>5<br>5<br>7<br>5<br>4<br>5<br>5<br>5<br>5<br>5<br>5<br>5 |
| 103        | 616        | 50           | r                  | n              | 5/11/29              | 25.8             | 35.2                | 8.25         | 5   |
| 103 .      | 617        | 100          | r                  | n              | 5/11/29              | 24.8             | 35.2                | 8.25         | 5   |
| 104        | 623        | 100          | r                  | n              | 5/13/29              | 25.3             | 35.3                | 8.21         | 7   |
| 105        | 628        | 50           | r                  | n              | 5/15/29<br>5/27/29   | 26.8             | 34.9                | 8.23         | 5   |
| 108        | 648        | 100          | r                  | n              |                      | 25.2             | 35.0                | 8.23         | 4   |
| 109        | 656        | 100          | r                  | n              | 5/29/29              | 19.4             | 34.8                | 8.18         | 5   |
| 113        | 681        | 50           | r                  | n              | 6/25/29              | 23.8             | 34.6                | 8.25<br>8.34 | 15  |
| 132<br>133 | 797<br>804 | 0            | r                  | n              | 9/ 8/29<br>9/10/29   | 21.0<br>22.7     | 33.9<br>34.7        | 8.47         | 7   |
| 134        | 808        | 0            | r                  | n<br>n         | 9/12/29              | 22.9             | 34.7                | 8.34         | 6   |
| 135        | 826        | 100          | r                  | p              | 9/14/29              | 18.7             | 34.8                | 8.34         | 5   |
| 136        | 827        | 0            | r                  | n              | 9/16/29              | 24.6             | 35.4                | 8.37         | 3   |
| 136        | 828        | 50           | r                  | n              | 9/16/29              | 21.4             | 35.1                | 8.39         | 6<br>5<br>3<br>7<br>5<br>5  |
| 140        | 860        | 0            | r                  | р              | 10/ 3/29             | 26.9             | 35.0                | 8.42         | 7   |
| 141        | 864        | 0            | r                  | n              | 10/ 5/29             | <b>25</b> .9     | 35.2                | 8.34         | 5   |
| 141        | 865        | 50           | r                  | n              | 10/ 5/29             | 24.8             | 35.3                | 8.34         | 5   |
| 142        | 874        | 100          | r                  | n              | 10/ 7/29             | 16.6             | 34.4                | 8.27         | 7   |
| 142        | 876        | 0            | r                  | p              | 10/ 7/29             | 24.1             | 34.8                | 8.33         | 5   |
| 143        | 883        | 100          | r                  | n              | 10/ 9/29             | 13.8             | 34.1                | 8.30         | 10  |
| 144        | 886        | 100          | r                  | n              | 10/11/29             | 23.3             | 35.0                | 8.37<br>8.31 | 6   |
| 145<br>146 | 892<br>898 | 100<br>100   | r                  | n              | 10/13/29<br>10/15/29 | 16.0<br>19.7     | $\frac{34.1}{34.3}$ | 8.31         | 6<br>7  |
| 140        | 905        | 100          | r                  | n<br>n         | 10/15/29             | 19.7             | 35.0                | 8.29         | 5   |
| 150        | 931        | 100          | r                  | n              | 10/23/29             | 19.6             | 34.6                | 8.32         | - 11  |
| 100        | 701        | 100          |                    | 1.1            | 10/20/20             | 10.0             |                     | 0.02         |   |

Table 3. Distributional and environmental records for Ceratium gravidum

| Station  | Sample     | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date               | Temperature (°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|----------|------------|-----------|-----------------------|----------------|--------------------|------------------|--------------------|--------------|--------------------------------------|
| 1        | 1          | 0         | r                     | n              | 5/12/28            | 24.0             | 36.2               | 8.16         | 34                                   |
| îb       | 6          | ŏ         | r                     | n              | 5/16/28            | (22.3            | 36.3               | 8.20         | 46)                                  |
| 1b       | 6          | 50        | ос                    | n              | 5/16/28            | (22.2            | 36.4               | 8.21         | 39)                                  |
| 1b       | 8          | 100       | oc                    | n              | 5/16/28            | (20.3            | 35.5               | 8.18         | 36)                                  |
| 15       | 98         | 50        | r                     | p              | 8/11/28            | 19.8             | 36.5               | 8.21         | 8                                    |
| 15       | 99         | 100       | r                     | p              | 8/11/28            | 18.4             | 36.4               | 8.20         | 19                                   |
| 15       | 101        | 50        | oc                    | 'n             | 8/11/28            | 19.8             | 36.5               | 8.21         | 8                                    |
| 15       | 102        | 100       | $\mathbf{r}$          | n              | 8/11/28            | 18.4             | 36.4               | 8.20         | 19                                   |
| 16       | 107        | 50        | r                     | n              | 8/13/28            | 24.4             | 36.4               | 8.23         | 8                                    |
| 16       | 108        | 100       | r                     | n              | 8/13/28            | 19.9             | 36.5               | 8.17         | 13                                   |
| 18       | 116        | 100       | r                     | p              | 8/17/28            | 20.4             | 36.8               | 8.21         | 5                                    |
| 18       | 119        | 100       | oc                    | n              | 8/17/28            | 20.4             | 36.8               | 8.21         | 5<br>5<br>3<br>5<br>9<br>13          |
| 19       | 124        | 100       | oc                    | n              | 8/20/28            | 22.4             | 37.0               | 8.25         | 5                                    |
| 20       | 129        | 50        | r                     | n              | 8/22/28            | 25.8             | 36.6               | 8.26         | 3                                    |
| 20       | 130        | 100       | oc                    | n              | 8/22/28            | 22.6             | 36.7               | 8.19         | 5                                    |
| 22       | 143        | 50        | r                     | n              | 8/27/28            | 24.5             | 36.2               | 8.21         | 9                                    |
| 23       | 149        | 50        | r                     | n              | 8/29/28            | 20.9             | 36.0               | 8.14         | 13                                   |
| 24<br>25 | 155        | 50        | oc                    | n              | 8/31/28            | 23.1             | 36.0               | 8.14         | 12                                   |
| 25       | 158        | 50        | Г                     | p              | 9/ 3/28            | 21.5             | 36.0               | 8.22<br>8.22 | 12                                   |
| 25       | 161        | 50        | oc                    | n              | 9/ 3/28            | 21.5<br>21.5     | 36.0<br>36.0       | 8.22         | 12<br>12                             |
| 25<br>25 | 161        | 50<br>100 | r                     | n              | 9/ 3/28<br>9/ 3/28 | 21.5<br>14.6     | 35.7               | 7.93         | 121                                  |
| 26       | 162<br>164 | 50        | F                     | n              | 9/ 5/28            | 24.1             | 36.1               | 8.21         | 5                                    |
| 27       | 168        | 50        | r                     | p              | 9/ 7/28            | 26.0             | 36.2               | 8.30         | 4                                    |
| 27       | 171        | 50        | oc                    | p<br>n         | 9/ 7/28            | 26.0             | 36.2               | 8.30         | 4                                    |
| 27       | 171        | 50        | oc                    | n              | 9/ 7/28            | 26.0             | 36.2               | 8.30         | 4                                    |
| 28       | 177        | 50        | r                     | n              | 9/11/28            | 26.7             | 36.3               | 8.26         | 4                                    |
| 30       | 189        | 50        | r                     | n              | 9/15/28            | 27.8             | 36.1               | 8.29         |                                      |
| 31       | 192        | 50        | r                     | n              | 10/3/28            | 28.2             | 35.4               | 8.23         | 3 2                                  |
| 31       | 200        | 30        | •                     |                | 10, 0, 00          |                  |                    |              |                                      |

Table 4. Distributional and environmental records for Ceratium digitatum

| Station  | Sample     | Depth (m)  | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m <sup>3</sup> |
|----------|------------|------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------------|
| 25       | 158        | 50         | г                  | р              | 9/ 3/28            | 21.5                | 36.0               | 8.22         | 12                       |
| 26       | 164        | 50         | r                  | p              | 9/ 5/28            | 24.1                | 36.1               | 8.21         | 5                        |
| 45       | 257        | 50         | r                  | n              | 11/19/28           | 22.4                | 35.2               | 8.13         | 46                       |
| 46       | 265        | 50         | r                  | p              | 11/21/28           | 23.2                | 35.3               | 8.16         | 40                       |
| 49       | 279        | 100        | г                  | n              | 11/27/28           | 21.6                | 35.9               | 8.26         | 13                       |
| 49a      | 283        | 0          | r                  | n              | 11/28/28           | (23.2               | 36.0               | 8.23         | 13)                      |
| 50       | 287        | 0          | r                  | p              | 11/29/28           | 23.2                | 36.0               | 8.23         | 13                       |
| 52       | 302        | 0          | r                  | p              | 12/ 3/28           | 22.5                | 35.4               | 8.21         | 8                        |
| 53       | 305        | 100        | г                  | n              | 12/ 5/28           | 19.9                | 35.6               | 8.19         | 13                       |
| 54       | 322        | 0          | Г                  | p              | 12/14/28           | 23.4                | 35.5               | 8.22         | 9                        |
| 78       | 478        | 0          | r                  | р              | 2/20/29            | 24.6                | 36.0               | 8.17         | 32                       |
| 83       | 502        | 50         | r                  | n              | 3/ 2/29            | 27.4                | 36.5               | 8.24         | 25                       |
| 92<br>95 | 546        | 50         | r                  | n              | 3/29/29            | 28.4                | 35.4               | 8.29         | 28<br>21                 |
| 99       | 564<br>591 | 100<br>100 | r                  | n              | 4/24/29            | 28.5<br>27.8        | 35.4<br>35.0       | 8.22<br>8.22 | 17                       |
| 100      | 596        | 50         | r                  | n              | 5/ 2/29<br>5/ 4/29 | 27.6                | 34.7               | 8.21         | 10                       |
| 102      | 611        | 100        | r                  | n              | 5/ 9/29            | 25.6                | 35.0               | 8.23         | 8                        |
| 102      | 612        | 0          | r                  | n              | 5/ 9/29            | 25.8                | 35.0               | 8.24         | ο ο                      |
| 105      | 629        | 100        | r                  | p<br>n         | 5/15/29            | 25.2                | 35.1               | 8.23         | 8<br>5                   |
| 107      | 641        | 100        | r                  | n              | 5/19/29            | 26.8                | 34.9               | 8.23         | 11                       |
| 136      | 829        | 100        | r                  | n              | 9/16/29            | 18.6                | 35.0               | 8.39         | 13                       |
| 140      | 858        | 100        | r                  | n              | 10/3/29            | 25.5                | 35.0               | 8.34         | 3<br>7                   |
| 145      | 891        | 50         | r                  | n              | 10/13/29           | 18.7                | 34.3               | 8.34         | 6                        |
| 147      | 905        | 100        | r                  | n              | 10/17/29           | 19.2                | 35.0               | 8.29         | 6<br>5                   |
| 151      | 939        | 100        | r                  | n              | 10/26/29           | 12.5                | 34.6               |              |                          |
| 155      | 967        | 100        | r                  | n              | 11/ 2/29           | 27.2                | 35.0               | 8.30         | 35                       |

Table 5. Distributional and environmental records for Ceratium candelabrum

| Station  | Sample     | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pH           | PO4<br>mg/m3       |
|----------|------------|--------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------|
| 1        | 1          | 0            | ос                 | n              | 5/12/28            | 24.0                | 36.2               | 8.16         | 34                 |
| īa       | $\bar{4}$  | Ö            | r                  | n              | 5/14/28            | (22.3               | 36.3               | 8.20         | 46)                |
| 1a       | 5          | 0            | r                  | n              | 5/14/28            | (22.3               | 36.3               | 8.20         | 46)                |
| 1b       | 6          | 0            | oc                 | n              | 5/16/28            | (22.3               | 36.3               | 8.20         | 46)                |
| 1b       | 7          | 50           | oc                 | n              | 5/16/28            | (22.2               | 36.3               | 8.20         | 39)                |
| 2        | 14         | 0            | r                  | n              | 5/18/28            | 20.5                | 36.4               | 8.23         | 58                 |
| 13a      | 89         | _0           | r                  | n              | 8/ 8/28            | (16.3               | 34.0               | 8.14         | 15)                |
| 14       | 92         | 50           | Г                  | р              | 8/ 9/28            | 15.0                | 35.1               | 8.18         | 16                 |
| 14       | 93         | 0            | r                  | p              | 8/ 9/28            | 21.2                | 35.2               | 8.18         | 11                 |
| 14       | 95         | 50           | Г                  | n              | 8/ 9/28            | 15.0                | 35.1               | 8.18         | 16                 |
| 15       | 99         | 100          | r                  | p              | 8/11/28            | 18.4                | 36.4               | 8.20<br>8.20 | 19                 |
| 15<br>16 | 102        | 100          | ос                 | n              | 3/11/28<br>8/13/28 | 18.4<br>25.9        | 36.4<br>36.2       | 8.24         | 19<br>8            |
| 16       | 103<br>104 | 0<br>50      | r                  | p              | 8/13/28            | 24.4                | 36.4               | 8.23         | 8                  |
| 16       | 104        | 0            | r                  | p<br>n         | 8/13/28            | 25.9                | 36.2               | 8.24         | Q<br>Q             |
| 16       | 107        | 50           | r                  | n              | 8/13/28            | 24.4                | 36.4               | 8.23         | 8                  |
| 16       | 108        | 100          | r                  | n              | 8/13/28            | 19.9                | 36.5               | 8.17         | 8<br>8<br>13       |
| 17       | 109        | 0            | oc                 | p              | 8/15/28            | 26.2                | 36.6               | 8.29         | 9                  |
| 17       | 111        | ő            | r                  | n              | 8/15/28            | 26.2                | 36.6               | 8.29         | 9                  |
| 17       | 112        | 50           | r                  | n              | 8/15/28            | 21.9                | 36.6               | 8.28         | 12                 |
| 18       | 114        | Ô            | r                  | p              | 8/17/28            | 27.0                | 37.0               | 8.23         | 5                  |
| 18       | 115        | 50           | ос                 | p              | 8/17/28            | 22.4                | 36.8               | 8.24         | 5                  |
| 18       | 116        | 100          | г                  | p              | 8/17/28            | 20.4                | 36.8               | 8.21         | 5                  |
| 18       | 117        | 0            | oc                 | n              | 8/17/28            | 27.0                | 37.0               | 8.23         | 5                  |
| 18       | 118        | 50           | r                  | n              | 8/17/28            | 22.4                | 36.8               | 8.24         | 5                  |
| 19       | 123        | 50           | r                  | n              | 8/20/28            | 25.2                | 37.1               | 8.27         | 5                  |
| 19       | 124        | 100          | r                  | n              | 8/20/28            | 22.4                | 37.0               | 8.25         | 5                  |
| 20       | 126        | 50           | r                  | p              | 8/22/28            | 25.8                | 36.6               | 8.26         | 3                  |
| 20       | 128        | 0            | r                  | n              | 8/22/28            | 26.0                | 36.6               | 8.37         | 5                  |
| 20       | 129        | 50           | oc                 | n              | 8/22/28            | 25.8                | 36.6               | 8.26         | 3                  |
| 20       | 130        | 100          | oc                 | n              | 8/22/28<br>8/23/28 | 22.6<br>(26.6       | 36.7<br>36.3       | 8.19<br>8.32 | 12555555553535354) |
| 20-21    | 131 .      | 0<br>100     | c                  | n              | 8/24/28            | 21.0                | 36.8               | 8.20         | 7                  |
| 21<br>21 | 134<br>135 | 0            | c<br>oc            | p<br>n         | 8/24/28            | 26.6                | 36.3               | 8.32         | 4                  |
| 21       | 137        | 100          | r                  | n<br>n         | 8/24/28            | 21.0                | 36.8               | 8.20         | 4 7                |
| 22       | 139        | 0            | oc                 | p              | 8/27/28            | 26.7                | 36.0               | 8.26         | 8                  |
| 22       | 143        | 50           | r                  | n<br>n         | 8/27/28            | 24.5                | 36.2               | 8.21         | 8                  |
| 23       | 145        | 0            | oc                 | p              | 8/27/28            | 26.7                | 36.0               | 8.26         | 8                  |
| 23       | 149        | 50           | oc                 | n              | 8/27/28            | 24.5                | 36.2               | 8.21         | 9                  |
| 23       | 150        | 100          | r                  | n              | 8/29/28            | 16.6                | 36.0               | 8.18         | 75                 |
| 24       | 152        | 50           | r                  | p              | 8/31/28            | 23.1                | 36.0               | 8.14         | 8                  |
| 25       | 157        | 0            | ос                 | p              | 9/ 3/28            | 27.5                | 35.6               | 8.31         | 5                  |

Table 5. Distributional and environmental records for Ceratium candelabrum--Continued

| Table    |             |           |                    |                |                      | Ceratium cando      |                    | , onemiu     |              |
|----------|-------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------|
| Station  | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m3 |
| 25       | 158         | 50        | oc                 | р              | 9/ 3/28              | 21.5                | 36.0               | 8.22         | 12           |
| 25       | 160         | 0         | r                  | n              | 9/3/28               | 27.5                | 35.6               | 8.31         | 5            |
| 25       | 161         | 50        | , oc               | n              | 9/ 3/28              | 21.5                | 36.0               | 8.22         | 12           |
| 26<br>26 | 164<br>165  | 50<br>100 | r                  | p              | 9/ 5/28<br>9/ 5/28   | 24.1<br>14.9        | 36.1<br>35.6       | 8.21         | 5<br>40      |
| 27       | 171         | 50        | r                  | p<br>n         | 9/ 7/28              | 26.0                | 36.2               | 8.30         | 4            |
| 28       | 177         | 50        | r                  | n              | 9/11/28              | - 26.7              | 36.3               | 8.26         | $\tilde{4}$  |
| 30       | 189         | 50        | r                  | n              | 9/15/28              | 27.8                | 36.1               | 8.29         | 3            |
| 31       | 193         | 100       | r                  | n              | 10/ 3/28             | 23.4                | 36.5               | 8.19         | 28           |
| 32<br>32 | 194A<br>195 | 0<br>50   | r                  | p<br>n         | 10/ 5/28<br>10/ 5/28 | 28.0<br>27.2        | 36.0<br>36.0       | 8.23<br>8.24 | 2 2          |
| 32       | 196         | 100       | r                  | n              | 10/ 5/28             | 22.2                | 36.4               | 8.10         | 30           |
| 33       | 197A        | 0         | r                  | p              | 10/ 8/28             | 28.5                | 35.6               | 8.23         | 4            |
| 34       | 200         | 0         | , oc               | n              | 10/ 9/28             | 28.5                | 35.9               | 8.28         | 2 2          |
| 34<br>34 | 200A<br>201 | 0<br>100  | r<br>oc            | p<br>n         | 10/ 9/28<br>10/ 9/28 | 28.5<br>20.5        | 35.9<br>36.6       | 8.28<br>8.16 | 16           |
| 35       | 205         | 100       | r                  | n              | 10/26/28             | 14.4                | 34.9               | 7.88         | 189          |
| 35       | 206         | 0         | r                  | p              | 10/26/28             | 27.4                | 29.7               | 8.31         | 15           |
| 35-36    | 209         | 0         | $\mathbf{r}$       | n              | 10/27/28             | (27.0               | 30.0               | 8.27         | 16)          |
| 35-36    | 211         | 0         | r                  | n              | 10/27/28             | (27.0<br>26.5       | 30.0               | 8.27         | 16)          |
| 36<br>36 | 213<br>215  | 0<br>100  | r                  | n<br>n         | 10/30/28<br>10/30/28 | 26.5<br>14.4        | 31.5<br>34.9       | 8.23<br>7.85 | 16<br>149    |
| 36       | 216         | 0         | r                  | p              | 10/30/28             | 26.5                | 31.5               | 8.23         | 16           |
| 37       | 218         | 50        | r                  | n              | 11/ 1/28             | 18.8                | 34.5               | 8.00         | 121          |
| 37       | 219         | 100       | r                  | n              | 11/ 1/28             | 15.1                | 34.9               | 7.82         | 153          |
| 40<br>41 | 232<br>238  | 0         | r                  | p<br>p         | 11/ 8/28<br>11/10/28 | 22.2<br>20.4        | 33.7<br>34.2       | 8.21<br>8.11 | 24<br>32     |
| 41a      | 240         | ŏ         | r                  | n              | 11/12/28             | (19.6               | 34.5               | 8.09         | 39)          |
| 43       | 244         | 0         | r                  | n              | 11/15/28             | 19.6                | 34.8               | 8.09         | 52           |
| 44       | 250         | 0         | oc                 | n              | 11/17/28             | 20.7                | 34.9               | 8.03         | 38           |
| 44<br>44 | 251<br>253  | 50<br>0   | oc                 | n              | 11/17/28<br>11/17/28 | 20.4<br>20.7        | 34.9<br>34.9       | 8.04<br>8.03 | 34<br>38     |
| 45       | 256         | 0         | oc<br>oc           | p<br>n         | 11/19/28             | 22.4                | 35.3               | 8.12         | 38           |
| 45       | 257         | 50        | oc                 | n              | 11/19/28             | 22.4                | 35.2               | 8.13         | 46           |
| 45       | 258         | 100       | r                  | n              | 11/19/28             | 18.6                | 35.1               | 8.00         | 50           |
| 45<br>45 | 259<br>260  | 0<br>50   | r                  | þ              | 11/19/28             | 22.4<br>22.4        | 35.3<br>35.2       | 8.12         | 38<br>46     |
| 46       | 261         | 0         | r                  | p<br>n         | 11/19/28<br>11/21/28 | 23.3                | 35.3               | 8.13<br>8.16 | 36           |
| 46       | 262         | 50        | r                  | n              | 11/21/28             | 23.2                | 35.3               | 8.16         | 40           |
| 46       | 263         | 100       | oc                 | n              | 11/21/28             | 22.5                | 35.4               | 8.17         | 40           |
| 46       | 264         | 0         | oc                 | p              | 11/21/28             | 23.3                | 35.3               | 8.16         | 36           |
| 47       | 266<br>267  | 0<br>50   | r<br>oc            | n<br>n         | 11/23/28<br>11/23/28 | 23.9<br>23.8        | 36.0<br>36.0       | 8.23<br>8.23 | 17<br>20     |
| 47       | 268         | 100       | oc                 | n              | 11/23/28             | 22.7                | 36.2               | 8.23         | 20           |
| 47       | 269         | 0         | oc                 | p              | 11/23/28             | 23.9                | 36.0               | 8.23         | 17           |
| 48       | 273         | 100       | oc                 | n              | 11/25/28             | 22.7                | 36.3               | 8.26         | 16           |
| 48       | 274<br>278  | 0<br>50   | r                  | p<br>n         | 11/25/28<br>11/27/28 | 23.6<br>22.6        | 36.4<br>36.1       | 8.23<br>8.26 | 13<br>13     |
| 49       | 279         | 100       | r                  | n              | 11/27/28             | 21.6                | 35.9               | 8.26         | 13           |
| 50       | 285         | 50        | r                  | n              | 11/29/28             | 22.0                | 35.9               | 8.23         | 13           |
| 50       | 288         | 50        | oc                 | p              | 11/29/28             | 22.0                | 35.9               | 8.23         | 13           |
| 51<br>51 | 294<br>295  | 50<br>100 | r                  | n<br>n         | 12/ 1/28<br>12/ 1/28 | 20.5<br>20.0        | 35.6<br>35.6       | 8.22<br>8.22 | 17<br>17     |
| 52       | 300         | 50        | oc                 | n              | 12/ 3/28             | 20.2                | 35.6               | 8.20         | 8            |
| 52       | 301         | 100       | oc                 | n              | 12/ 3/28             | 18.2                | 35.2               | 8.17         | 8            |
| 53       | 305         | 100       | r                  | n              | 12/ 5/28             | 19.9                | 35.6               | 8.19         | 13           |
| 54<br>54 | 320<br>321  | 50<br>100 | oc<br>oc           | n<br>n         | 12/14/28<br>12/14/28 | 19.8<br>18.7        | 35.4<br>35.4       | 8.18<br>8.16 | 17<br>20     |
| 55       | 324         | 50        | oc                 | n              | 12/16/28             | 18.7                | 35.0               | 8.18         | 12           |
| 55       | 325         | 100       | ос                 | n              | 12/16/28             | 16.7                | 34.9               | 7.17         | 12           |
| 56       | 328         | 0         | ос                 | n ·            | 12/18/28             | 20.8                | 34.9               | 8.13         | 9            |
| 56<br>56 | 329<br>330  | 50<br>100 | oc<br>oc           | n              | 12/18/28<br>12/18/28 | 18.5<br>16.6        | 35.1<br>34.8       | 8.14<br>8.11 | 9<br>12      |
| 56       | 332         | 50        | r                  | n<br>p         | 12/18/28             | 18.5                | 35.1               | 8.14         | 9            |
| 56       | 333         | 100       | r                  | p              | 12/18/28             | 16.6                | 34.8               | 8.11         | 12           |
| 56-57    | 334         | 0         | oc                 | n              | 12/19/28             | (19.0               | 34.5               | 8.14         | 20)          |
| 57       | 335         | 0         | r                  | n .            | 12/20/28             | 19.0<br>15.6        | 34.5               | 8.14<br>8.14 | 20<br>21     |
| 57<br>57 | 336<br>337  | 50<br>100 | oc<br>r            | n<br>n         | 12/20/28<br>12/20/28 | 14.3                | 34.3<br>34.4       | 8.10         | 40           |
| 57       | 338         | 0         | r                  | p              | 12/20/28             | 19.0                | 34.5               | 8.14         | 20           |
| 57       | 340         | 100       | r                  | p              | 12/20/28             | 14.3                | 34.4               | 8.10         | 40           |
| 58       | 341         | 0         | r                  | n              | 12/22/28             | 17.0                | 34.0               | 8.12         | 20           |
| 58<br>59 | 342<br>351  | 50<br>0   | r                  | n              | 12/22/28<br>12/24/28 | 14.8<br>16.3        | 34.0<br>34.0       | 8.12<br>8.10 | 25<br>38     |
| 61       | 363         | 0         | oc                 | p<br>n         | 12/28/28             | 16.9                | 34.0               | 8.05         | 46           |
| 61       | 364         | 50        | r                  | n              | 12/28/28             | 14.0                | 34.0               | 8.05         | 60           |
|          |             |           |                    |                |                      |                     |                    |              |              |

Table 5. Distributional and environmental records for Ceratium candelabrum -- Continued

|                |                            | Depth          | Relative     | Appa-  |   | Temperature    | Salinity                     |              | PO4        |
|----------------|----------------------------|----------------|--------------|--------|---|----------------|------------------------------|--------------|------------|
| Station        | Sample                     | (m)            | abundance    | ratus  | Date  | (°C)           | (0/00)                       | pН           | mg/m3      |
| 61             | 365                        | 100            | r            | n      | 12/28/28  | 10.8           | 34.0                         | 8.03         | 80         |
| 61<br>61-62    | <b>36</b> 6<br><b>36</b> 9 | 0              | oc           | p<br>n | $\frac{12}{28}$ $\frac{28}{29}$ $\frac{12}{29}$ $\frac{28}{28}$ | 16.9<br>(16.9  | 34.0<br>34.0                 | 8.05<br>8.05 | 46<br>46)  |
| 61-62          | 370                        | ő              | c            | n      | 12/29/28  | (16.9          | 34.0                         | 8.05         | 46)        |
| 62             | 371                        | 0              | С            | n      | 12/30/28  | 19.2           | 34.2<br>34.3                 | 8.12<br>8.10 | 32<br>28   |
| 62<br>62       | 372<br>373                 | 50<br>100      | c<br>c       | n<br>n | $\frac{12}{30}$   | 16.2<br>13.1   | 34.2                         | 8.06         | 48         |
| 62             | 374                        | 0              | oc           | p      | 12/30/28  | 19.2           | 34.2                         | 8.12         | 32         |
| 62<br>63       | 375<br>379                 | 50<br>0        | f r          | p<br>n | 12/30/28 1/ 1/29  | 16.2<br>20.5   | 34.3<br>34.6                 | 8.10<br>8.07 | 28<br>21   |
| 63             | 381                        | 100            | r            | n      | 1/ 1/29   | 15.6           | 34.6                         | 8.08         | 24         |
| 63<br>63-64    | 384<br>387                 | 100<br>0       | r            | p<br>n | 1/ 1/29<br>1/ 2/29  | 15.6<br>(20.5  | 34.6<br>34.6                 | 8.08<br>8.07 | 24<br>21)  |
| 63-64          | 390                        | 0              | r            | n      | 1/ 2/29   | (20.5          | 34.6                         | 8.07         | 21)        |
| 64             | 395                        | 50             | r            | n      | 1/ 3/29<br>1/ 3/29  | 17.2<br>15.8   | 34.6<br>34.5                 | 8.12<br>8.10 | 29<br>32   |
| 64<br>64-65    | 396<br>401                 | 100            | oc<br>oc     | n<br>n | 1/ 3/29   | (20.6          | 34.6                         | 8.12         | 21)        |
| 64-65          | 402                        | 0              | oc           | n      | 1/ 4/29   | (20.6          | 34.6                         | 8.12         | 21)        |
| 64-65<br>64-65 | 403<br>404                 | 0              | r            | n<br>n | 1/ 4/29<br>1/ 4/29  | (20.6<br>(20.6 | 34.6<br>34.6                 | 8.12<br>8.12 | 21)<br>21) |
| 65             | 408                        | 0              | r            | p      | 1/ 5/29   | 20.2           | 34.5                         | 8.10         | 24         |
| 65<br>66       | 409<br>415                 | 50<br>100      | r            | p<br>p | 1/ 5/29<br>1/ 7/29  | 16.5<br>17.8   | 34.5<br>34.9                 | 8.10<br>8.12 | 25<br>21   |
| 67             | 416                        | 0              | r            | n      | 1/8/29  | 19.3           | 34.9                         | 8.11         | 21         |
| 67             | 418                        | 100            | oc           | n      | 1/8/29<br>2/10/29   | 16.2<br>14.7   | 34.6<br>35.0                 | 8.05<br>7.80 | 40<br>178  |
| 73<br>75       | 452<br>462                 | 100<br>0       | r<br>oc      | n<br>n | 2/14/29   | 22.8           | 35.8                         | 8.18         | 44         |
| 76             | 467                        | 0              | oc ,         | n      | 2/16/29   | 23.4           | 35.9                         | 8.15         | 50         |
| 76<br>76       | 468<br>4 <b>6</b> 9        | 50<br>100      | r<br>r       | n<br>n | 2/16/29<br>2/16/29  | 22.1<br>21.2   | <b>35</b> .9<br><b>35</b> .8 | 8.14<br>8.12 | 42<br>45   |
| 76             | 471                        | 50             | $\mathbf{r}$ | p      | 2/16/29   | 22.1           | <b>35</b> .9                 | 8.14         | 42         |
| 77<br>78       | 474<br>475                 | 50<br>0        | oc<br>oc     | p<br>n | 2/18/29<br>2/20/29  | 23.5<br>24.6   | 36.0<br>36.0                 | 8.19<br>8.17 | 16<br>32   |
| 78             | 476                        | 50             | oc           | n      | 2/20/29   | 23.8           | 36.1                         | 8.14         | 32         |
| 78<br>78       | 477<br>478                 | 100            | oc           | n      | 2/20/29<br>2/20/29  | 21.9<br>24.6   | 36.2<br>36.0                 | 8.14<br>8.17 | 34<br>32   |
| 78             | 479                        | 50             | oc<br>oc     | p<br>p | 2/20/29   | 23.8           | 36.1                         | 8.14         | 32         |
| 79             | 481                        | 0<br>50        | oc           | n      | 2/22/29<br>2/22/29  | 25.2<br>24.5   | 36.0<br>36.1                 | 8.17<br>8.17 | 34<br>34   |
| 79<br>79       | 482<br>483                 | 100            | oc<br>oc     | n<br>n | 2/22/29   | 21.8           | 36.2                         | 8.13         | 45         |
| 79             | 484                        | 0              | oc           | p      | 2/22/29   | 25.2           | 36.0                         | 8.17         | 34<br>34   |
| 79<br>80       | 485<br>486                 | 50<br>0        | oc<br>oc     | p<br>n | 2/22/29<br>2/24/29  | 24.5<br>26.0   | 36.1<br>35.9                 | 8.17<br>8.20 | 36         |
| 80             | 487                        | 50             | r            | n      | 2/24/29   | <b>25</b> .9   | 36.0                         | 8.19         | 29         |
| 80<br>80       | 488<br>489                 | 0<br>50        | oc<br>oc     | p<br>p | 2/24/29<br>2/24/29  | 26.0<br>25.9   | 35.9<br>36.0                 | 8.20<br>8.19 | 36<br>29   |
| 80             | 490                        | 100            | r            | p      | 2/24/29   | 23.4           | 36.2                         | 8.16         | 32         |
| 81<br>81       | 491<br>492                 | 0<br>50        | c<br>oc      | n<br>n | 2/26/29<br>2/26/29  | 26.5<br>26.4   | 35.8<br>35.9                 | 8.19<br>8.19 | 38<br>38   |
| 81             | 493                        | 0              | r            | p      | 2/26/29   | 26.5           | 35.8                         | 8.19         | 38         |
| 81             | 494                        | 50             | r            | p      | 2/26/29<br>2/26/29  | 26.4<br>23.6   | 35.9<br>36.2                 | 8.19<br>8.18 | 38<br>36   |
| 91<br>32       | 495<br>496                 | 100            | oc oc        | p<br>n | 2/28/29   | 27.2           | 36.3                         | 8.21         | 34         |
| 32             | 497                        | 50             | r            | n      | 2/28/29   | 27.2<br>27.4   | 36.3<br>36.5                 | 8.21<br>8.24 | 34<br>25   |
| 83<br>84       | 502<br>506                 | 50<br>50       | r<br>oc      | n<br>n | 3/ 2/29<br>3/ 4/29  | 27.5           | 36.4                         | 8.21         | 24         |
| 85             | 510                        | 0              | oc           | n      | 3/6/29  | 27.9           | 36.2                         | 8.22         | 40         |
| 85<br>85       | 511<br>513                 | 50<br>50       | r            | n<br>p | 3/ 6/29<br>3/ 6/29  | 27.8<br>27.8   | 36.2<br>36.2                 | 8.22<br>8.22 | 40<br>40   |
| 86             | 517                        | 50             | r            | n      | 3/9/29  | 27.4           | 36.2                         | 8.29         | 17         |
| 86             | 519<br>522                 | 50<br>50       | r            | p<br>n | 3/ 9/29<br>3/11/29  | 27.4<br>26.5   | 36.2<br>36.1                 | 8.29<br>8.26 | 17<br>20   |
| 87<br>87       | 524                        | 50<br>50       | oc<br>r      | p      | 3/11/29   | 26.5           | 36.1                         | 8.26         | 20         |
| 88             | 526                        | 0              | oc           | n      | 3/21/29<br>3/21/29  | 28.5<br>28.4   | 35.9<br>35.9                 | 8.23<br>8.25 | 16<br>13   |
| 88<br>89       | 527<br>528                 | 50<br>0        | oc           | n<br>n | 3/21/29 3/23/29   | 28.4           | 35.6                         | 8.25         | 21         |
| 89             | 529                        | 50             | oc           | n      | 3/23/29   | 28.6           | 35.8                         | 8.27         | 12         |
| 90<br>90       | 533<br>534                 | 0<br>50        | c<br>oc      | n<br>n | 3/25/29<br>3/25/29  | . 28.5<br>28.6 | 35.5<br>35.6                 | 8.27<br>8.26 | 21<br>21   |
| 90             | 535                        | 0              | r            | p      | 3/25/29   | 28.5           | 35.5                         | 8.27         | 21         |
|                |                            |                |              |        | 3/25/29   | 28.6           | 35.6                         | 8.26         | 21         |
| 90             | 536                        | 50             | r            | p      |   |                |                              |              |            |
| 90<br>91       | 537<br>540                 | 50<br>100<br>0 | r<br>r<br>r  | p<br>p | 3/25/29<br>3/27/29  | 26.3<br>28.7   | 35.8<br>35.1                 | 8.24<br>8.30 | 21<br>21   |
| 90             | 537                        | 100            | r            | p      | 3/25/29   | 26.3           | 35.8                         | 8.24         | 21         |

Table 5. Distributional and environmental records for Ceratium candelabrum--Continued

| Station   Sample   (m)   abundance   ratus   Date   (°C)   (n) (n)   pH   mg/m³   mg   | 1       |        | T 50 //   |                    | T              |         | t Ceratium can      | ,                  |      |                          |
|--|---------|--------|-----------|--------------------|----------------|---------|---------------------|--------------------|------|--------------------------|
| 92 546 50  | Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date    | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
| 92 546 50  | 91      | 544    | 100       | oc                 | n              | 3/27/29 | 25.8                | 36.0               | 8.25 | 30                       |
| 93 551 50 r p 3/31/29 28.5 34.8 8.30 28 Samoa 555 0 r p 3/31/29 28.7 34.7 8.20 28 94 558 50 r n 4/22/29 29.3 34.7 8.25 14 94 560 0 r p 4/22/29 29.5 34.7 8.25 14 95 563 50 oc n 4/24/29 29.3 34.7 8.25 14 95 566 0 r p 4/22/29 29.3 34.7 8.25 14 96 568 0 oc n 4/24/29 29.3 35.4 8.22 21 96 568 0 r n 4/26/29 29.3 35.3 8.23 12 96 568 0 r n 4/26/29 29.3 35.3 8.23 12 96 569 50 r n 4/26/29 29.3 35.3 8.23 12 96 573 100 r n 4/26/29 29.2 35.3 8.23 12 96 573 100 r p 4/26/29 29.2 35.3 8.23 12 97 575 50 oc n 4/28/29 29.2 35.3 8.23 12 97 575 50 oc n 4/28/29 29.2 35.3 8.23 12 97 575 50 oc n 4/28/29 29.2 35.3 8.23 12 97 575 50 oc n 4/28/29 29.3 35.4 8.26 14 97 575 50 oc n 4/28/29 29.2 35.3 8.23 12 97 575 50 oc n 4/28/29 29.2 35.3 8.23 12 98 588 100 r p 4/28/29 28.0 35.4 8.16 24 99 595 590 50 r p 4/28/29 27.6 35.6 8.15 25 98 588 100 r p 4/28/29 27.6 35.6 8.15 25 98 588 100 oc n 4/28/29 27.6 35.6 8.15 25 98 588 100 oc n 4/28/29 27.6 35.6 8.15 25 99 590 50 c n 5/2/29 27.8 35.9 8.22 12 99 591 100 oc n 5/2/29 27.8 35.9 8.22 12 99 591 100 oc n 5/2/29 27.8 35.9 8.22 12 99 591 100 oc n 5/2/29 27.8 35.9 8.22 12 99 592 0 oc p 5/2/29 27.8 35.9 8.22 12 99 593 50 0 c n 5/2/29 27.8 35.9 8.22 12 99 594 100 oc n 5/2/29 27.8 35.9 8.22 12 100 596 50 c n 5/2/29 27.8 35.9 8.22 12 100 597 100 c n 5/2/29 27.8 35.9 8.22 12 100 598 0 oc n 5/2/29 27.8 35.9 8.22 12 100 598 0 oc n 5/2/29 27.8 35.9 8.22 12 100 599 591 100 oc n 5/2/29 27.8 35.9 8.22 12 100 596 50 c n 5/2/29 27.8 35.9 8.22 12 100 602 100 oc n 5/2/29 27.8 35.9 8.22 12 100 602 100 oc n 5/2/29 27.8 35.9 8.22 12 100 602 100 oc n 5/2/29 27.8 35.9 8.25 11 100 602 100 oc n 5/2/29 27.8 35.9 8.25 15 103 616 50 r n 5/1/29 25.8 35.0 8.24 8.21 104 605 100 oc n 5/1/29 25.8 35.0 8.25 15 103 616 50 r n 5/1/29 26.8 34.7 8.21 10 104 602 100 oc n 5/1/29 25.8 35.0 8.25 55 103 618 0 r n 5/1/29 26.8 34.7 8.21 10 106 634 50 r n 5/1/29 26.8 34.7 8.21 10 107 640 50 c n 5/1/29 25.8 35.0 8.23 55 108 634 50 r n 5/1/29 26.8 34.9 8.23 55 106 635 100 r n 5/1/29 26.8 34.9 8.23 55 107 640 50 c n 5/1/29 26.8 34.9 8.23 55 107 6 |         |        |           |                    |                | 3/29/29 | 28.4                |                    | 8.29 | 28                       |
| 93 552 0 r p 3/31/29 28.7 34.7 8.30 28 Samoa 555 0 r n n   |         |        |           |                    |                | 3/29/29 |                     |                    |      |                          |
| Samoa 555 0 r n 4/22/29 29.3 34.7 8.25 14 94 560 0 r n 4/22/29 29.5 34.7 8.25 14 95 563 50 oc n 4/24/29 29.3 34.7 8.25 14 95 563 50 oc n 4/24/29 29.3 34.7 8.25 14 95 566 100 r n 4/24/29 29.3 34.7 8.25 14 95 566 0 r n 4/24/29 29.3 34.7 8.25 14 95 566 0 r n 4/24/29 29.3 34.7 8.25 14 96 568 0 oc n 4/26/29 29.3 35.3 8.23 12 96 572 50 r n 4/26/29 29.3 35.3 8.23 12 96 572 50 r p 4/26/29 29.3 35.3 8.23 12 96 573 100 r p 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.7 8.19 97 575 50 oc n 4/28/29 28.3 35.4 8.22 97 576 100 oc n 4/28/29 28.3 35.4 8.16 24 97 579 100 r p 4/26/29 29.2 35.3 8.16 24 98 581 0 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 5/2/29 27.6 35.6 8.15 25 98 581 0 oc n 5/2/29 27.8 34.9 8.22 12 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 591 100 c n 5/2/29 27.8 34.9 8.22 12 99 592 0 oc p 5/2/29 27.8 34.9 8.22 12 99 593 50 r p 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/2/29 27.8 34.9 8.22 12 100 597 579 100 c n 5/2/29 27.8 34.9 8.22 12 100 597 579 100 c n 5/2/29 27.8 34.9 8.22 12 100 597 591 100 c n 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/2/29 27.8 34.9 8.22 12 100 597 591 100 c n 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/2/29 27.8 34.9 8.22 12 100 597 100 c n 5/2/29 27.8 34.9 8.22 12 100 598 0 oc p 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 604 50 oc n 5/4/29 27.6 34.7 8.21 10 100 606 0 r p 5/4/29 27.6 34.7 8.21 10 100 606 0 r p 5/4/29 27.6 34.7 8.21 10 100 607 100 0 c n 5/11/29 26.0 35.0 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 7 104 622 50 r n 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.0 35.0 8.23 5 104 608 50 lor n 5/11/29 27.0 35.0 8.23 5 106 634 50 r n 5/11/29 27.0 35.0 8.23 5 106 635 100 r n 5/11/29 26.8 34.9 8.23 5 106 636 100 r n 5/11/29 26.8 34.9 8.23 5 107 640 50 c n 5/11/29 26.8 34.9 8.23 5 107 640 50 c n 5/11/29 26.8 34.9 8.23 11  |         |        |           |                    |                |         |                     |                    |      | 28                       |
| 94 558 50  |         |        |           |                    |                | 3/31/29 | 40.1                | 34.7               | 8.30 |                          |
| 94 560 0 r p 4/22/29 29.5 34.7 8.25 14 95 563 50 oc n 4/24/29 28.5 35.4 8.22 21 95 564 100 r p 4/24/29 28.5 35.4 8.22 21 96 568 0 oc n 4/26/29 29.3 34.7 8.26 14 96 568 0 r p 4/24/29 29.3 34.7 8.26 14 96 568 0 r p 4/24/29 29.3 35.3 8.23 12 95 568A 0 r n 4/26/29 29.3 35.3 8.23 12 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 96 573 100 r p 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.7 8.19 25 97 574 0 oc n 4/28/29 28.3 35.7 8.19 25 97 575 100 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 5/2/29 27.8 34.9 8.22 12 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 591 100 c n 5/2/29 27.8 34.9 8.22 12 99 592 0 oc p 5/2/29 27.8 34.9 8.22 12 99 593 50 oc n 5/2/29 27.8 34.9 8.21 12 99 594 100 oc p 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/2/29 27.8 34.9 8.21 12 100 597 599 100 c n 5/2/29 27.8 34.9 8.22 12 100 597 598 0 oc p 5/2/29 27.8 34.9 8.22 12 100 597 598 0 oc p 5/2/29 27.8 34.9 8.22 12 100 598 580 0 oc p 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/2/29 27.8 34.9 8.22 12 100 597 100 c n 5/2/29 27.8 34.9 8.22 12 100 598 0 oc p 5/2/29 27.8 34.9 8.22 12 100 599 590 0 oc p 5/2/29 27.8 34.9 8.22 12 100 596 50 c n 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc n 5/7/29 26.2 34.7 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 26.0 35.0 8.25 5 103 618 0 r n 5/11/29 26.0 35.0 8.23 5 104 625 50 r n 5/11/29 26.0 35.0 8.23 5 105 638 100 r n 5/11/29 26.0 35.0 8.23 5 106 634 50 r n 5/11/29 26.0 35.0 8.23 5 106 635 100 r n 5/11/29 26.0 35.0 8.23 5 107 640 50 oc n 5/11/29 26.0 35.1 8.23 5 108 634 9 0 r n 5/11/29 26.0 35.0 8.23 5 106 635 100 r n 5/11/29 26.0 35.0 8.23 5 106 636 100 r n 5/11/29 26.8 34.9 8.23 5  |         |        |           |                    |                | 4/22/29 | 29.3                | 34.7               | 8.25 |                          |
| 95 564 100 r n 4/24/29 28.5 35.4 8.22 21 95 565 0 r p 4/24/29 29.4 34.7 8.26 14) 96 568 0 oc n 4/26/29 29.2 35.3 8.23 12 95 568A 0 r n 4/26/29 29.2 35.3 8.23 12 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 96 573 100 r p 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 575 50 oc n 4/28/29 28.3 35.2 8.16 24 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 97 579 100 r p 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/28/29 27.6 35.6 8.15 25 98 581 100 r p 4/30/29 27.6 35.6 8.15 25 99 590 50 c n 5/2/29 27.8 35.0 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 12 99 593 50 r p 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 34.9 8.22 12 99 595 100 c n 5/2/29 27.8 34.9 8.21 12 100 596 50 c n 5/2/29 27.8 34.9 8.21 12 100 597 100 c n 5/2/29 27.8 34.9 8.21 12 100 598 0 oc p 5/2/29 27.8 34.9 8.21 12 100 598 0 oc p 5/2/29 27.8 34.9 8.21 12 100 598 0 oc p 5/2/29 27.8 34.7 8.21 10 100 602 100 oc p 5/2/29 27.8 34.7 8.21 10 100 697 100 c n 5/4/29 27.6 34.7 8.21 10 100 698 0 oc p 5/4/29 27.6 34.7 8.21 10 100 699 0 oc p 5/4/29 27.6 34.7 8.21 10 100 696 100 oc n 5/7/29 25.2 35.1 8.23 8 101 605 100 oc n 5/7/29 25.8 35.0 8.22 17 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 692 100 oc n 5/7/29 25.2 35.1 8.23 8 101 605 100 oc n 5/7/29 25.8 35.0 8.24 8 102 609 0 oc n 5/7/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.24 8 104 625 50 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 25.8 35.0 8.24 7 104 625 50 r n 5/11/29 26.0 35.0 8.25 5 105 630 0 r n 5/11/29 25.8 35.0 8.23 5 106 633 0 r n 5/11/29 25.8 35.0 8.23 5 106 634 50 r n 5/11/29 27.0 35.0 8.23 5 106 635 100 r n 5/11/29 27.0 35.0 8.23 5 106 634 50 r n 5/11/29 27.0 35.0 8.23 5 107 640 50 c n 5/11/29 27.0 34.4 8.23 5 107 640 50 c n 5/11/29 27.0 34.4 8.23 5  |         |        |           |                    |                | 4/22/29 |                     |                    |      |                          |
| 95   |         |        |           |                    |                |         |                     |                    |      |                          |
| 96 568 0 oc n 4/26/29 29.3 35.3 8.23 12 95 568A 0 r n n 4/25/29 (29.4 34.7 8.26 14) 96 569 50 r p 4/26/29 29.2 35.3 8.23 12 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 96 573 100 r p 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/30/29 27.0 35.3 8.12 24 99 591 100 c n p 4/30/29 27.0 35.3 8.12 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 35.0 8.22 17 99 593 50 r p 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 12 100 597 100 c n 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 17 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc n 5/7/29 25.2 35.1 8.23 8 101 605 100 oc n 5/7/29 25.8 35.0 8.24 8 102 613 50 r p 5/4/29 27.6 34.7 8.21 10 104 625 50 r p 5/4/29 27.6 34.7 8.21 10 105 606 0 r p 5/4/29 27.6 34.7 8.24 8 102 613 50 r p 5/1/29 25.8 35.0 8.24 8 103 616 50 r p 5/1/29 25.8 35.0 8.24 8 104 625 50 r p 5/1/29 25.8 35.0 8.24 8 105 668 50 r p 5/1/29 25.8 35.0 8.25 5 103 616 50 r p 5/1/29 25.8 35.0 8.25 5 104 625 50 r p 5/1/29 26.0 35.0 8.25 5 105 630 0 r p 5/1/29 26.8 34.9 8.23 5 106 633 0 r n 5/17/29 26.8 34.9 8.23 5 106 633 0 r n 5/17/29 25.8 35.0 8.23 5 107 640 50 0 r n 5/17/29 26.8 34.9 8.23 11   |         |        |           |                    |                | 4/24/29 |                     |                    |      |                          |
| 95 568A 0 r n 4/25/29 (29.4 34.7 8.26 14) 96 579 50 r p 4/26/29 29.2 35.3 8.23 12 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 96 573 100 r p 4/26/29 28.2 35.7 8.19 25 97 574 0 0 c n 4/28/29 28.3 35.2 8.16 24 97 575 50 0 c n 4/28/29 28.0 35.4 8.16 21 97 576 100 or p 4/26/29 27.6 35.6 8.15 25 97 579 100 r p 4/28/29 27.6 35.6 8.15 25 98 581 0 0 c n 4/28/29 27.6 35.6 8.15 25 98 581 10  or p 4/30/29 27.0 35.3 8.16 24 98 588 100 r p 4/30/29 27.0 35.3 8.16 24 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 35.0 8.22 17 99 593 50 r p 5/2/29 27.8 35.0 8.22 17 99 594 100 oc p 5/2/29 27.8 35.0 8.22 17 99 595 0 c n 5/2/29 27.8 35.0 8.22 12 100 596 50 c n 5/2/29 27.8 35.0 8.22 12 100 596 50 c n 5/2/29 27.8 35.0 8.22 12 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.24 8 101 605 100 oc n 5/7/29 25.2 35.1 8.23 8 101 605 100 oc n 5/7/29 25.8 35.0 8.24 8 101 605 100 oc n 5/7/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 7 104 625 50 r n 5/11/29 24.8 35.2 8.25 5 103 616 50 r n 5/11/29 25.8 35.0 8.24 7 104 625 50 r n 5/11/29 25.8 35.0 8.24 7 104 625 50 r n 5/11/29 25.8 35.0 8.24 7 104 625 50 r n 5/11/29 25.8 35.0 8.23 5 106 634 50 r n 5/11/29 25.8 35.0 8.24 7 107 640 50 c n 5/11/29 27.9 34.4 8.23 5 108 635 100 r n 5/11/29 25.8 35.0 8.24 7 104 621 0 r n 5/11/29 25.8 35.0 8.24 5 105 638 0 r n 5/11/29 25.8 35.0 8.23 5 106 635 100 r n 5/11/29 27.9 34.4 8.23 5   |         |        |           |                    |                | 4/24/29 |                     |                    |      |                          |
| 96 569 50  |         |        |           |                    |                | 4/25/29 |                     |                    |      |                          |
| 966 572 50 r p 4/26/29 29.2 35.3 8.23 12 977 574 0 oc n 4/28/29 28.3 35.2 8.16 24 977 575 50 oc n 4/28/29 28.0 35.4 8.16 21 977 576 100 oc n 4/28/29 27.6 35.6 8.15 25 977 579 100 r p 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/30/29 26.7 35.4 8.14 32 99 590 50 c n 5/2/29 27.8 35.9 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 35.0 8.22 17 99 593 50 r p 5/2/29 27.8 34.9 8.21 12 99 594 100 oc p 5/2/29 27.8 34.9 8.21 12 99 595 0 oc n 5/2/29 27.8 34.9 8.21 12 99 596 50 c n 5/2/29 27.8 35.0 8.22 17 100 596 50 c n 5/2/29 27.8 35.0 8.22 17 100 597 100 c n 5/2/29 27.8 34.9 8.21 12 100 598 0 oc p 5/2/29 27.8 34.9 8.21 12 100 598 0 oc p 5/2/29 27.8 34.9 8.21 12 100 598 0 oc p 5/2/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.22 12 100 598 0 oc p 5/4/29 27.6 34.7 8.22 12 100 602 100 oc p 5/4/29 27.6 34.7 8.22 12 100 602 100 oc p 5/4/29 27.6 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.22 12 101 605 100 oc n 5/7/29 26.2 34.7 8.24 8 101 606 0 r p 5/4/29 27.6 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 102 609 0 or n 5/7/29 26.3 35.0 8.24 8 103 616 50 r n 5/1/29 25.8 35.0 8.24 8 104 625 50 r n 5/1/29 25.8 35.0 8.24 8 105 630 0 r p 5/1/29 26.8 35.0 8.24 8 106 635 100 or n 5/1/29 25.8 35.0 8.25 5 103 618 0 r p 5/1/29 26.9 34.9 8.23 5 104 625 50 r n 5/1/29 26.9 34.9 8.23 5 105 630 0 r p 5/1/29 26.9 34.9 8.23 5 106 634 50 r n 5/1/29 25.8 35.0 8.24 7 104 625 50 r n 5/1/29 26.9 34.9 8.23 5 105 630 0 r p 5/1/29 26.9 34.9 8.23 5 106 634 50 r n 5/1/29 25.8 35.0 8.24 7 104 625 50 r n 5/1/29 26.9 34.9 8.23 5 106 635 100 r n 5/1/29 26.9 34.9 8.23 5 107 640 50 oc n 5/1/29 27.9 34.4 8.23 5 108 634 50 r n 5/1/29 27.9 34.4 8.23 5 109 640 50 oc n 5/1/29 27.9 34.4 8.23 5 106 635 100 r n 5/1/29 27.9 34.4 8.23 5 107 640 50 oc n 5/1/29 27.9 34.4 8.23 5 107 640 50 oc n 5/1/29 27.9 34.4 8.23 5 107 640 50 oc n 5/1/29 27.9 34.4 8.23 5   |         |        |           |                    |                | 4/26/29 |                     | 35.3               | 8.23 | 12                       |
| 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/28/29 27.6 35.6 8.15 25 98 583 100 r p 4/28/29 27.6 35.4 8.14 32 99 590 50 c n 5/2/29 27.8 35.9 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 36.0 8.22 17 99 593 50 c n 5/2/29 27.8 36.0 8.22 17 99 594 100 oc p 5/2/29 27.8 36.0 8.22 17 99 595 0 oc n 5/2/29 27.8 36.0 8.22 17 99 597 100 c n 5/2/29 27.8 36.0 8.22 17 100 596 50 c n 5/2/29 27.8 36.0 8.22 17 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 605 100 oc n 5/7/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.22 12 101 604 50 oc n 5/7/29 25.8 35.0 8.24 8 102 619 0 or n 5/1/29 26.3 34.7 8.24 8 103 616 50 r n 5/1/29 26.0 35.0 8.25 5 103 617 100 oc n 5/1/29 26.0 35.0 8.25 5 103 618 0 r p 5/1/29 26.0 35.0 8.25 5 103 618 0 r p 5/1/29 26.0 35.0 8.25 5 103 617 100 oc n 5/1/29 26.8 35.2 8.24 7 104 622 50 r n 5/1/29 26.8 35.2 8.24 7 105 628 50 r n 5/1/29 26.8 35.2 8.24 7 104 625 50 r n 5/1/29 26.8 35.2 8.24 7 105 630 0 r p 5/1/29 26.8 35.2 8.24 7 106 634 50 r n 5/1/29 26.8 35.2 8.24 7 107 640 50 oc n 5/1/29 27.9 34.4 8.23 5 106 635 100 r n 5/1/29 27.9 34.4 8.23 5 107 640 50 oc n 5/1/29 27.9 34.4 8.23 5  |         |        |           |                    |                | 4/26/29 |                     |                    | 8.23 | 12                       |
| 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 98 581 0 oc n 4/30/29 27.0 35.3 8.16 24 98 588 100 r p 4/30/29 27.0 35.3 8.16 24 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 591 100 c n 5/2/29 27.8 34.9 8.22 17 99 592 0 oc p 5/2/29 27.8 34.9 8.21 12 99 593 50 r p 5/2/29 27.8 34.9 8.21 12 99 594 100 oc p 5/2/29 27.8 34.9 8.21 12 99 595 50 c n 5/2/29 27.8 34.9 8.21 12 100 596 50 c n 5/2/29 27.8 34.9 8.21 12 100 596 50 c n 5/4/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 604 50 oc p 5/4/29 27.6 34.7 8.21 10 100 605 100 oc n 5/7/29 26.3 34.7 8.24 8 101 606 100 oc n 5/7/29 26.2 34.7 8.24 8 101 606 100 oc n 5/7/29 26.3 34.7 8.24 8 102 609 0 oc n 5/7/29 26.3 34.7 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.25 5 104 622 50 r n 5/11/29 25.8 35.2 8.25 5 103 617 100 oc n 5/11/29 26.8 34.9 8.23 5 104 622 50 r n 5/11/29 26.8 35.9 8.24 7 105 628 50 r n 5/11/29 26.8 35.9 8.25 5 106 634 50 r n 5/11/29 25.8 35.2 8.25 5 107 640 50 oc n 5/11/29 27.0 35.0 8.23 5 107 640 50 oc n 5/11/29 27.0 35.0 8.23 5 107 640 50 oc n 5/11/29 27.0 35.0 8.23 5 107 640 50 oc n 5/11/29 26.8 34.9 8.23 11   |         |        |           |                    |                | 4/26/29 |                     |                    |      | 25                       |
| 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 98 581 00 r p 4/28/29 27.0 35.3 8.16 24 98 588 100 r p 4/30/29 27.0 35.3 8.16 24 98 588 100 r p 4/30/29 27.0 35.3 8.16 24 99 590 50 c n 5/2/29 27.8 34.9 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 35.0 8.22 17 99 593 50 r p 5/2/29 27.8 34.9 8.21 12 99 594 100 oc p 5/2/29 27.8 34.9 8.21 12 99 595 50 c n 5/2/29 27.8 34.9 8.21 12 100 596 50 c n 5/2/29 27.8 35.0 8.22 17 100 597 100 c n 5/2/29 27.8 34.9 8.21 12 100 598 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 605 100 oc p 5/4/29 27.6 34.7 8.21 10 100 606 100 oc p 5/4/29 27.6 34.7 8.21 10 100 607 100 c n 5/7/29 26.2 34.7 8.24 8 101 606 0 r p 5/4/29 27.6 34.7 8.22 12 101 606 5 100 oc n 5/7/29 25.2 35.1 8.23 8 101 606 100 oc n 5/7/29 25.2 35.1 8.23 8 102 609 0 oc n 5/7/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 103 615 0 r p 5/9/29 25.8 35.0 8.24 8 104 625 50 r n 5/11/29 26.0 35.0 8.25 5 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.8 35.2 8.25 5 103 616 50 r n 5/11/29 26.8 35.2 8.25 5 104 622 50 r n 5/11/29 26.8 35.2 8.25 5 105 630 0 r p 5/11/29 26.8 35.2 8.25 5 105 630 0 r p 5/11/29 26.8 35.2 8.25 5 106 634 50 r n 5/11/29 26.8 35.2 8.25 5 107 640 50 oc n 5/11/29 27.8 35.0 8.24 7 105 628 50 r n 5/11/29 26.8 34.9 8.23 5 106 634 50 r n 5/11/29 27.2 35.0 8.23 5 107 640 50 oc n 5/11/29 27.2 35.0 8.23 5 107 640 50 oc n 5/11/29 27.8 35.1 8.23 5 107 640 50 oc n 5/11/29 27.8 35.0 8.23 5 107 640 50 oc n 5/11/29 27.8 34.9 8.23 11  |         |        |           |                    |                |         |                     |                    |      |                          |
| 97 579 100 r p 4/28/29 27.6 35.6 8.15 25 98 581 100 r p 4/30/29 27.0 35.3 8.16 24 98 588 100 r p 4/30/29 26.7 35.4 8.14 32 99 590 50 c n 5/2/29 27.8 35.9 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 35.0 8.21 12 99 593 50 r p 5/2/29 27.8 35.0 8.22 17 99 594 100 oc p 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 100 596 50 c n 5/4/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 604 50 oc n 5/7/29 26.2 34.7 8.21 10 100 605 100 oc n 5/7/29 25.8 35.0 8.24 8 101 606 0 r p 5/9/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 25.8 35.0 8.24 8 104 625 50 r n 5/11/29 25.8 35.0 8.24 7 104 622 50 r n 5/11/29 25.8 35.0 8.24 7 104 622 50 r n 5/11/29 25.8 35.0 8.25 5 103 616 50 r n 5/11/29 25.8 35.0 8.25 5 104 621 0 r n 5/11/29 25.8 35.0 8.24 7 104 622 50 r n 5/11/29 25.8 35.2 8.25 5 105 638 50 r n 5/11/29 25.8 35.0 8.25 5 106 634 50 r n 5/11/29 25.8 35.0 8.25 5 107 640 600 r n 5/11/29 25.8 35.0 8.25 5 108 634 50 r n 5/11/29 25.8 35.0 8.25 5 109 643 50 r n 5/11/29 25.8 35.0 8.25 5 106 634 50 r n 5/11/29 25.8 35.0 8.25 5 107 639 0 r n 5/11/29 25.8 35.0 8.23 5 106 634 50 r n 5/11/29 25.8 35.0 8.23 5 107 639 0 r n 5/11/29 25.8 35.1 8.23 5 107 639 0 r n 5/11/29 25.8 35.1 8.23 5 107 639 0 r n 5/11/29 25.8 35.1 8.23 5 107 640 50 0 c n 5/11/29 27.2 35.0 8.23 5 107 640 60 635 100 r n 5/11/29 27.2 35.0 8.23 5 107 639 0 r n 5/11/29 27.2 35.0 8.23 5   |         |        |           |                    |                | 4/28/29 |                     |                    |      | 21<br>25                 |
| 98   |         |        |           |                    |                | 4/28/29 |                     |                    |      | 25                       |
| 98 588 100 r p 4/30/29 26.7 35.4 8.14 32 99 591 100 c n 5/2/29 27.8 34.9 8.22 12 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 592 0 oc p 5/2/29 27.8 34.9 8.21 12 99 594 100 oc p 5/2/29 27.8 34.9 8.21 12 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 100 596 50 c n 5/2/29 27.8 34.9 8.21 12 100 597 100 c n 5/2/29 27.8 34.9 8.21 12 100 598 0 oc n 5/2/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc n 5/4/29 27.6 34.7 8.21 10 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 26.2 34.7 8.24 8 101 606 0 r p 5/7/29 26.3 34.7 8.24 8 102 612 0 r p 5/7/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 25.8 35.0 8.24 8 104 622 50 r n 5/11/29 25.8 35.0 8.25 5 103 616 50 r n 5/11/29 25.8 35.0 8.25 5 104 621 0 r p 5/1/29 25.8 35.0 8.25 5 105 628 50 r n 5/11/29 25.8 35.2 8.25 5 106 633 0 r n 5/11/29 25.8 35.2 8.25 5 107 640 620 r n 5/11/29 26.9 34.9 8.23 5 106 634 50 r n 5/11/29 25.8 35.2 8.25 5 107 639 0 r n 5/11/29 26.9 34.9 8.23 5 107 640 50 oc n 5/19/29 27.2 35.0 8.23 5 107 639 0 r n 5/11/29 27.2 35.0 8.23 5 107 639 0 r n 5/11/29 26.8 34.9 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4 107 641 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5   |         |        |           |                    |                | 4/30/29 |                     |                    |      |                          |
| 99 591 100 c n 5/2/29 27.8 35.0 8.22 17 99 593 50 r p 5/2/29 27.8 34.9 8.21 12 99 594 100 oc p 5/2/29 27.8 34.9 8.21 12 100 596 50 c n 5/2/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 26.2 34.7 8.24 8 101 606 0 r p 5/7/29 26.3 34.7 8.24 8 102 609 0 oc n 5/7/29 25.2 35.1 8.23 8 101 606 0 r p 5/9/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 103 615 0 r p 5/9/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.0 35.0 8.25 5 104 622 50 r n 5/11/29 26.8 35.2 8.25 5 105 630 0 r p 5/11/29 26.8 35.2 8.25 5 104 622 50 r n 5/11/29 26.8 35.2 8.25 5 105 630 0 r p 5/11/29 26.8 35.2 8.24 7 104 622 50 r n 5/11/29 26.8 35.2 8.24 7 105 638 0 r p 5/11/29 26.8 35.2 8.24 7 106 633 0 r p 5/11/29 26.8 35.2 8.24 7 107 639 0 r n 5/11/29 27.0 35.0 8.23 5 106 635 100 r n 5/11/29 27.0 35.0 8.23 5 107 639 0 r n 5/11/29 27.0 35.0 8.23 5 107 639 0 r n 5/11/29 27.0 35.0 8.23 5 107 640 50 0c n 5/19/29 27.9 34.4 8.23 11   |         |        |           |                    |                | 4/30/29 |                     |                    |      | 32                       |
| 99 592 0 oc p 5/2/29 27.8 34.9 8.21 12 99 593 50 r p 5/2/29 27.8 34.9 8.22 17 99 595 0 oc p 5/2/29 27.8 34.9 8.22 17 100 596 50 c n 5/2/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 101 604 50 oc n 5/7/29 26.2 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 26.2 34.7 8.24 8 101 606 0 r p 5/7/29 26.3 34.7 8.24 8 102 609 0 oc n 5/7/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.25 5 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.0 35.0 8.25 5 104 621 0 r n 5/11/29 26.0 35.0 8.25 5 105 628 50 r n 5/13/29 25.8 35.2 8.25 5 104 621 0 r n 5/13/29 26.1 35.2 8.25 5 105 628 50 r n 5/13/29 25.8 35.0 8.24 7 104 622 50 r n 5/13/29 25.8 35.0 8.24 7 105 628 50 r n 5/13/29 25.8 35.0 8.25 5 106 633 0 r n 5/13/29 25.8 35.0 8.23 5 106 633 0 r n 5/17/29 27.0 35.0 8.23 5 107 639 0 r n 5/17/29 27.0 35.0 8.23 5 107 639 0 r n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 5   |         |        |           |                    |                | 5/ 2/29 |                     |                    |      | 12                       |
| 99 593 50 r p 5/2/29 27.8 34.9 8.22 12 99 594 100 oc p 5/2/29 27.8 33.0 8.22 17 100 596 50 c n 5/2/29 27.6 34.7 8.21 10 100 597 100 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc n 5/7/29 27.6 34.7 8.21 10 100 604 50 oc n 5/7/29 27.6 34.7 8.21 10 101 604 50 oc n 5/7/29 27.6 34.7 8.22 12 101 604 50 oc n 5/7/29 27.6 34.7 8.24 8 101 606 0 r p 5/4/29 27.6 34.7 8.24 8 102 609 0 oc n 5/7/29 26.2 34.7 8.24 8 102 609 0 oc n 5/7/29 26.3 34.7 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.24 8 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 26.0 35.0 8.25 5 103 618 0 r p 5/11/29 26.1 35.2 8.25 5 104 622 50 r n 5/11/29 26.1 35.2 8.25 5 105 630 0 r p 5/13/29 26.8 35.2 8.25 5 106 633 0 r p 5/13/29 25.8 35.2 8.24 7 104 622 50 r n 5/13/29 26.8 35.2 8.24 7 104 622 50 r n 5/13/29 26.8 35.2 8.24 7 104 625 50 r n 5/13/29 26.8 35.2 8.24 7 104 625 50 r n 5/13/29 26.8 35.2 8.24 7 105 638 0 r n 5/17/29 27.2 35.0 8.23 5 106 633 0 r n 5/17/29 27.2 35.0 8.23 5 106 634 50 r n 5/17/29 27.2 35.0 8.23 5 106 635 100 r n 5/17/29 27.0 35.0 8.23 5 107 640 50 0c n 5/19/29 27.9 34.4 8.23 5   |         |        |           |                    |                | 5/ 2/29 |                     |                    |      | 17                       |
| 99 595 0 oc n 5/2/29 27.9 34.9 8.21 12 100 596 50 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.7 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 101 604 50 oc n 5/7/29 26.2 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 26.3 34.7 8.24 8 101 606 0 r p 5/4/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 25.8 35.2 8.25 5 103 616 50 r n 5/11/29 24.8 35.2 8.25 5 103 617 100 oc n 5/11/29 24.8 35.2 8.25 5 103 618 0 r p 5/11/29 25.8 35.0 8.24 7 104 622 50 r n 5/11/29 25.8 35.2 8.25 5 104 621 0 r n 5/11/29 25.8 35.2 8.25 5 105 630 0 r p 5/11/29 26.1 35.2 8.24 7 104 622 50 r n 5/13/29 26.1 35.2 8.24 7 104 625 50 r n 5/13/29 26.1 35.2 8.24 7 104 625 50 r n 5/15/29 26.8 34.9 8.23 5 106 633 0 r n 5/17/29 27.2 35.0 8.23 5 106 633 100 r n 5/17/29 27.2 35.0 8.23 5 106 635 100 r n 5/17/29 27.2 35.0 8.23 5 107 640 50 oc n 5/19/29 28.0 34.4 8.23 5 107 640 50 oc n 5/19/29 26.8 34.9 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5  |         |        |           |                    |                | 5/ 2/29 |                     |                    |      |                          |
| 99 595 0 oc n 5/2/29 27.9 34.9 8.21 12 100 596 50 c n 5/4/29 27.6 34.7 8.21 10 100 598 0 oc p 5/4/29 27.7 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.21 10 101 604 50 oc n 5/7/29 26.2 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 26.3 34.7 8.24 8 101 606 0 r p 5/4/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 25.8 35.0 8.24 8 103 616 50 r n 5/11/29 25.8 35.2 8.25 5 103 616 50 r n 5/11/29 24.8 35.2 8.25 5 103 617 100 oc n 5/11/29 24.8 35.2 8.25 5 103 618 0 r p 5/11/29 25.8 35.0 8.24 7 104 622 50 r n 5/11/29 25.8 35.2 8.25 5 104 621 0 r n 5/11/29 25.8 35.2 8.25 5 105 630 0 r p 5/11/29 26.1 35.2 8.24 7 104 622 50 r n 5/13/29 26.1 35.2 8.24 7 104 625 50 r n 5/13/29 26.1 35.2 8.24 7 104 625 50 r n 5/15/29 26.8 34.9 8.23 5 106 633 0 r n 5/17/29 27.2 35.0 8.23 5 106 633 100 r n 5/17/29 27.2 35.0 8.23 5 106 635 100 r n 5/17/29 27.2 35.0 8.23 5 107 640 50 oc n 5/19/29 28.0 34.4 8.23 5 107 640 50 oc n 5/19/29 26.8 34.9 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5 107 640 50 oc n 5/19/29 27.0 35.0 8.23 5  |         |        |           |                    |                | 5/ 2/29 |                     |                    |      | 17                       |
| 100       596       50       c       n       5/4/29       27.6       34.7       8.21       10         100       597       100       c       n       5/4/29       27.7       34.7       8.21       10         100       598       0       oc       p       5/4/29       27.7       34.7       8.21       10         100       602       100       oc       p       5/4/29       27.6       34.7       8.21       10         100       602       100       oc       p       5/4/29       27.6       34.7       8.21       10         101       604       50       oc       n       5/7/29       26.2       34.7       8.24       8         101       605       100       oc       n       5/7/29       26.2       34.7       8.24       8         101       606       0       r       p       5/7/29       26.3       34.7       8.24       8         102       609       0       oc       n       5/9/29       25.8       35.0       8.24       8         102       619       0       r       p       5/9/29       25.8   |         |        |           |                    |                | 5/ 2/29 |                     |                    |      | 12                       |
| 100  |         |        |           |                    |                |         |                     |                    |      | 10                       |
| 100 599 50 oc p 5/4/29 27.6 34.7 8.21 10 100 602 100 oc p 5/4/29 27.6 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 25.2 35.1 8.23 8 101 606 0 r p 5/4/29 25.8 35.0 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.25 5 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 616 50 r n 5/11/29 24.8 35.2 8.25 5 103 616 50 r n 5/11/29 24.8 35.2 8.25 5 103 618 0 r p 5/11/29 24.8 35.2 8.25 5 104 621 0 r n 5/13/29 26.1 35.2 8.24 7 104 622 50 r n 5/13/29 26.1 35.2 8.24 7 104 622 50 r n 5/13/29 26.1 35.2 8.24 7 104 625 50 r n 5/13/29 25.8 35.2 8.24 7 105 628 50 r n 5/15/29 26.8 35.2 8.23 5 106 633 0 r n 5/15/29 26.9 34.9 8.23 5 106 634 50 r n 5/17/29 27.2 35.0 8.23 5 107 639 0 r n 5/17/29 27.0 35.0 8.23 5 107 639 0 r n 5/19/29 27.9 34.4 8.23 4 107 641 100 r n 5/19/29 27.9 34.4 8.23 11  |         |        |           |                    |                |         |                     |                    |      | 12                       |
| 100 602 100 oc p 5/4/29 27.6 34.7 8.22 12 101 604 50 oc n 5/7/29 26.2 34.7 8.24 8 101 605 100 oc n 5/7/29 25.2 35.1 8.23 8 101 606 0 r p 5/7/29 26.3 34.7 8.24 8 102 609 0 oc n 5/9/29 25.8 35.0 8.24 8 102 612 0 r p 5/9/29 25.8 35.0 8.24 8 102 613 50 r p 5/9/29 25.8 35.0 8.24 8 103 615 0 r n 5/11/29 26.0 35.0 8.25 5 103 616 50 r n 5/11/29 26.0 35.0 8.25 5 103 617 100 oc n 5/11/29 24.8 35.2 8.25 5 103 617 100 or n 5/11/29 24.8 35.2 8.25 5 104 621 0 r n 5/13/29 26.1 35.2 8.25 5 104 621 0 r n 5/13/29 26.1 35.2 8.24 7 104 622 50 r n 5/13/29 25.8 35.2 8.24 7 104 625 50 r n 5/13/29 25.8 35.2 8.24 7 105 628 50 r n 5/13/29 25.8 35.2 8.24 7 105 630 0 r p 5/13/29 25.8 35.2 8.24 7 105 633 0 r n 5/15/29 26.8 34.9 8.23 5 106 634 50 r n 5/17/29 27.2 35.0 8.23 5 106 635 100 r n 5/17/29 27.2 35.0 8.23 5 106 635 100 r n 5/17/29 27.2 35.0 8.23 5 107 640 50 oc n 5/19/29 26.8 34.9 8.23 5 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4 107 641 100 r n 5/19/29 27.9 34.4 8.23 11  |         |        |           |                    |                | 5/4/29  |                     |                    |      |                          |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |           |                    |                |         |                     |                    |      |                          |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |         |        |           |                    |                | 5/ 7/29 |                     |                    |      |                          |
| 101       606       0       r       p       5/7/29       26.3       34.7       8.24       8         102       609       0       oc       n       5/9/29       25.8       35.0       8.24       8         102       612       0       r       p       5/9/29       25.8       35.0       8.24       8         102       613       50       r       p       5/9/29       25.8       35.0       8.24       8         103       615       0       r       n       5/11/29       26.0       35.0       8.25       5         103       616       50       r       n       5/11/29       25.8       35.2       8.25       5         103       617       100       oc       n       5/11/29       26.0       35.0       8.25       5         103       617       100       oc       n       5/11/29       26.0       35.0       8.25       5         103       618       0       r       p       5/11/29       26.1       35.2       8.24       7         104       621       0       r       n       5/13/29       25.8       35.2 </td <td></td> <td></td> <td>100</td> <td></td> <td></td> <td>5/ 7/29</td> <td></td> <td></td> <td>8.23</td> <td>8</td>  |         |        | 100       |                    |                | 5/ 7/29 |                     |                    | 8.23 | 8                        |
| 102       612       0       r       p       5/9/29       25.8       35.0       8.24       8         102       613       50       r       p       5/9/29       25.8       35.0       8.24       8         103       615       0       r       n       5/11/29       26.0       35.0       8.25       5         103       616       50       r       n       5/11/29       25.8       35.2       8.25       5         103       617       100       oc       n       5/11/29       24.8       35.2       8.25       5         103       618       0       r       p       5/11/29       26.0       35.0       8.25       5         104       621       0       r       n       5/13/29       26.1       35.2       8.24       7         104       622       50       r       n       5/13/29       25.8       35.2       8.24       7         104       625       50       r       n       5/13/29       25.8       35.2       8.24       7         105       628       50       r       n       5/15/29       26.8       34.9<  |         |        |           |                    |                | 5/ 7/29 |                     |                    | 8.24 | 8                        |
| 104     622     50     r     n     5/13/29     25.8     35.2     8.24     7       104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     639     0     r     n     5/19/29     28.0     34.4     8.23     5       107     640     50     oc     n     5/19/29     27.9     34.4     8.23     4       107     641     100     r     n     5/19/29     26.8     34.9     8.23     11   |         |        |           |                    |                | 5/ 9/29 |                     |                    |      | 8                        |
| 104     622     50     r     n     5/13/29     25.8     35.2     8.24     7       104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     639     0     r     n     5/19/29     28.0     34.4     8.23     5       107     640     50     oc     n     5/19/29     27.9     34.4     8.23     4       107     641     100     r     n     5/19/29     26.8     34.9     8.23     11   |         |        |           |                    |                | 5/9/29  |                     |                    |      | 8                        |
| 104     622     50     r     n     5/13/29     25.8     35.2     8.24     7       104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     639     0     r     n     5/19/29     28.0     34.4     8.23     5       107     640     50     oc     n     5/19/29     27.9     34.4     8.23     4       107     641     100     r     n     5/19/29     26.8     34.9     8.23     11   |         |        |           |                    | p<br>n         | 5/11/29 |                     |                    |      | 5                        |
| 104     622     50     r     n     5/13/29     25.8     35.2     8.24     7       104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     639     0     r     n     5/19/29     28.0     34.4     8.23     5       107     640     50     oc     n     5/19/29     27.9     34.4     8.23     4       107     641     100     r     n     5/19/29     26.8     34.9     8.23     11   |         | 616    |           |                    |                |         |                     |                    | 8.25 | 5                        |
| 104     622     50     r     n     5/13/29     25.8     35.2     8.24     7       104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     639     0     r     n     5/19/29     28.0     34.4     8.23     5       107     640     50     oc     n     5/19/29     27.9     34.4     8.23     4       107     641     100     r     n     5/19/29     26.8     34.9     8.23     11   |         |        |           |                    | n              | 5/11/29 |                     | 35.2               | 8.25 | 5                        |
| 104     622     50     r     n     5/13/29     25.8     35.2     8.24     7       104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     639     0     r     n     5/19/29     28.0     34.4     8.23     5       107     640     50     oc     n     5/19/29     27.9     34.4     8.23     4       107     641     100     r     n     5/19/29     26.8     34.9     8.23     11   |         |        |           |                    |                |         |                     |                    |      | 5                        |
| 104     625     50     r     p     5/13/29     25.8     35.2     8.24     7       105     628     50     r     n     5/15/29     26.8     34.9     8.23     5       105     630     0     r     p     5/15/29     26.9     34.9     8.23     5       106     633     0     r     n     5/17/29     27.2     35.0     8.23     5       106     634     50     r     n     5/17/29     27.0     35.0     8.23     5       106     635     100     r     n     5/17/29     25.6     35.1     8.23     5       107     640     50     oc     n     5/19/29     28.0     34.4     8.23     5       107     641     100     r     n     5/19/29     27.9     34.4     8.23     1   |         |        |           |                    |                | 5/13/29 |                     |                    |      | 7                        |
| 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4<br>107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           |                    |                | 5/13/29 |                     |                    |      | 7                        |
| 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4<br>107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           |                    |                |         |                     |                    |      | 5                        |
| 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4<br>107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           | r                  |                | 3/15/29 | 26.9                | 34.9               | 8.23 | 5                        |
| 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4<br>107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           |                    |                | 5/17/29 |                     |                    |      | 5                        |
| 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4<br>107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           |                    |                |         |                     |                    |      | 5                        |
| 107 640 50 oc n 5/19/29 27.9 34.4 8.23 4<br>107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           |                    |                |         |                     |                    |      | 5                        |
| 107 641 100 r n 5/19/29 26.8 34.9 8.23 11  |         |        |           |                    |                |         |                     |                    | 8.23 | 4                        |
| 107         642         0         r         p         5/19/29         28.0         34.4         8.23         5           107         645         50         r         p         5/19/29         27.9         34.4         8.23         4           108         646         0         r         n         5/27/29         26.8         35.0         8.25         4           108         648         100         r         n         5/27/29         26.8         35.0         8.24         4           109         655         50         oc         n         5/29/29         23.1         35.0         8.22         3           109         656         100         c         n         5/29/29         19.4         34.8         8.18         5           109         658         50         r         p         5/29/29         23.1         35.0         8.22         3           110         661         0         c         n         5/31/29         23.9         34.7         8.18         5           110         663         100         oc         p         5/31/29         23.9         34.7         8.18 <t< td=""><td>107</td><td>641</td><td>100</td><td></td><td></td><td>5/19/29</td><td>26.8</td><td></td><td>8.23</td><td>11</td></t<>  | 107     | 641    | 100       |                    |                | 5/19/29 | 26.8                |                    | 8.23 | 11                       |
| 107 045 50 r p 5/19/29 27.9 34.4 8.23 4 108 646 0 r n 5/27/29 28.4 35.0 8.25 4 108 647 50 r n 5/27/29 26.8 35.0 8.24 4 108 648 100 r n 5/27/29 25.2 35.0 8.23 4 109 655 50 oc n 5/29/29 23.1 35.0 8.22 3 109 656 100 c n 5/29/29 19.4 34.8 8.18 5 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 110 661 0 c n 5/31/29 23.9 34.7 8.18 5 110 663 100 oc n 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 23.9 34.7 8.18 5 111 668 0 oc p 5/31/29 18.4 34.8 8.16 7 111 668 0 oc p 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5   |         |        |           |                    | p              |         |                     |                    |      | 5                        |
| 108 647 50 r n 5/27/29 26.8 35.0 8.24 4 108 648 100 r n 5/27/29 25.2 35.0 8.23 4 109 655 50 oc n 5/29/29 23.1 35.0 8.22 3 109 656 100 c n 5/29/29 19.4 34.8 8.18 5 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 110 661 0 c n 5/31/29 23.9 34.7 8.18 5 110 663 100 oc n 5/31/29 17.9 34.7 8.18 1 110 664 0 oc p 5/31/29 17.9 34.7 8.18 5 110 665 50 oc p 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 18.4 34.8 8.16 7 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5 112 675 50 r n 6/5/29 21.7 34.6 8.23 7   |         |        |           |                    |                |         |                     |                    | 8.23 | 4                        |
| 108 648 100 r n 5/27/29 25.2 35.0 8.23 4 109 655 50 oc n 5/29/29 23.1 35.0 8.22 3 109 656 100 c n 5/29/29 19.4 34.8 8.18 5 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 110 661 0 c n 5/31/29 23.9 34.7 8.18 5 110 663 100 oc n 5/31/29 17.9 34.7 8.14 11 110 664 0 oc p 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 23.9 34.7 8.18 5 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5 111 675 50 r n 6/3/29 20.1 34.5 8.18 5   |         |        |           |                    |                |         |                     |                    |      | 4                        |
| 109 655 50 oc n 5/29/29 23.1 35.0 8.22 3 109 656 100 c n 5/29/29 19.4 34.8 8.18 5 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 110 661 0 c n 5/31/29 23.9 34.7 8.18 5 110 663 100 oc n 5/31/29 17.9 34.7 8.14 11 110 664 0 oc p 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 18.4 34.8 8.16 7 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5 111 675 50 r n 6/5/29 21.7 34.6 8.23  |         |        |           |                    |                | 5/27/29 |                     |                    |      | 4                        |
| 109     656     100     c     n     5/29/29     19.4     34.8     8.18     5       109     658     50     r     p     5/29/29     23.1     35.0     8.22     3       110     661     0     c     n     5/31/29     23.9     34.7     8.18     5       110     663     100     oc     n     5/31/29     17.9     34.7     8.14     11       110     664     0     oc     p     5/31/29     23.9     34.7     8.18     5       110     665     50     oc     p     5/31/29     18.4     34.8     8.16     7       111     668     0     oc     n     6/3/29     20.1     34.5     8.18     5       111     671     0     oc     p     6/3/29     20.1     34.5     8.18     5       112     675     50     r     n     8/5/29     21.7     34.6     8.23     7   | 109     | 655    | 50        |                    |                |         |                     |                    | 8.22 | 3                        |
| 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 110 661 0 c n 5/31/29 23.9 34.7 8.18 5 110 663 100 oc n 5/31/29 17.9 34.7 8.14 11 110 664 0 oc p 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 18.4 34.8 8.16 7 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5 112 675 50 r n 6/5/29 21.7 34.6 8.23  |         |        | 100       |                    |                | 5/29/29 | 19.4                | 34.8               | 8.18 | 5                        |
| 110 661 0 c n 5/31/29 23.9 34.7 8.18 5 110 663 100 oc n 5/31/29 17.9 34.7 8.14 11 110 664 0 oc p 5/31/29 23.9 34.7 8.18 5 110 665 50 oc p 5/31/29 18.4 34.8 8.16 7 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5 112 675 50 r  |         |        |           |                    |                |         |                     |                    |      | 3                        |
| 110 664 0 oc p 5/31/29 23.9 34.7 8.14 11<br>110 665 50 oc p 5/31/29 18.4 34.8 8.16 7<br>111 668 0 oc n 6/3/29 20.1 34.5 8.18 5<br>111 671 0 oc p 6/3/29 20.1 34.5 8.18 5<br>112 675 50 r   |         |        |           |                    |                |         |                     |                    |      | 5                        |
| 110 665 50 oc p 5/31/29 18.4 34.8 8.16 7 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5 112 675 50 r  |         |        |           |                    |                |         |                     |                    |      | 11                       |
| 111 668 0 oc n 6/3/29 20.1 34.5 8.18 5<br>111 671 0 oc p 6/3/29 20.1 34.5 8.18 5<br>112 675 50 r n 6/5/29 21.7 34.6 8.23   |         |        |           |                    |                | 5/31/29 |                     |                    |      | 7                        |
| 111 671 0 oc p 6/3/29 20.1 34.5 8.18 5   |         |        | 0         |                    |                | 6/ 3/29 |                     |                    |      | 5                        |
| 112 675 50 r n 6/5/29 21 7 34 6 9 29 7   | 111     | 671    | 0         |                    |                | 6/3/29  | 20.1                | 34.5               | 8.18 | 5                        |
| 1 0/ 0/20 21.1 03.0 0.20   | 112     | 675    | 50        | $\mathbf{r}$       | n              | 6/5/29  | 21.7                | 34.6               | 8.23 | 7                        |
| 112 676 100 r n 6/5/29 19.8 34.7 8.20 8  |         |        |           |                    |                | 6/ 5/29 |                     |                    |      | 8                        |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5   |         |        |           |                    |                |         |                     |                    |      | 7                        |
| 113 680 0 oc n 6/25/29 24.2 34.5 8.25 5<br>113 681 50 oc n 6/25/29 23.8 34.6 8.25 5  | 113     |        |           |                    |                |         |                     |                    |      | 5                        |
| 113 682 100 r n 6/25/29 21.5 34.7 8.23 8   |         |        |           |                    |                |         |                     |                    |      | 8                        |
| 113 684 50 r p 6/25/29 23.8 34.6 8.25 5  |         |        |           |                    |                |         |                     |                    |      | 5                        |
| 114 686 0 oc n 6/27/29 19.9 34.3 8.15 7  |         |        |           |                    |                |         |                     | 34.3               |      |                          |

Table 5. Distributional and environmental records for Ceratium candelabrum -- Continued

| Station   Sample   Can   Melative   Appa   Date   Temperature   Salinity   P.H.   P.O.4   mg/ms.]   |         |        |           |              |       | 1        |                  | Idelabi dili-      |      |              |
|---|---------|--------|-----------|--------------|-------|----------|------------------|--------------------|------|--------------|
| 114 687 50 0 0c n 6/27/28 16.2 34.6 8.04 63 114 688 10 0 0c n 6/27/28 13.0 34.5 8.04 63 115 6892 0 0 0c n 6/27/28 13.0 34.5 8.00 91 115 6892 0 0 0c n 6/27/28 13.0 34.5 8.00 91 115 6892 0 0 0c n 6/27/28 13.0 34.5 8.00 91 115 6892 0 0 0 0c n 7/25/28 12.0 8 34.5 8.00 91 117 709 50 r n 6/28/29 17.5 34.6 8.12 17 118 7790 0 0c n 7/25/28 16.4 33.0 8.12 17 128 7790 0 0 r n 7/25/28 16.4 33.0 8.12 29 130 788 0 0 r n 7/25/28 16.3 33.1 8.13 29 130 784 0 0 0c n 9/4/29 16.2 33.4 8.34 88 130 786 100 r p 9/4/29 16.2 33.4 8.34 88 130 787 0 0 c n 9/4/29 16.2 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.7 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.7 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.7 33.4 8.34 8.34 132 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 133 788 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.1 33.4 8.34 8.36 131 789 100 0c n 9/6/29 11.3 33.4 8.34 8.34 132 789 100 0c n 9/6/29 11.3 33.4 8.34 8.36 133 789 50 r n 9/8/29 11.0 33.9 8.34 15 132 789 50 r n 9/8/29 11.0 33.9 8.34 15 132 789 50 r n 9/8/29 11.6 33.9 8.34 15 133 880 0 0 r n 9/8/29 11.6 33.9 8.34 15 133 881 0 0 r n 9/8/29 11.6 33.9 8.34 15 134 809 50 r n 9/8/29 11.6 33.9 8.34 15 135 825 50 r n 9/8/29 12.0 33.9 8.34 15 136 828 50 r n 9/8/29 12.0 33.9 8.34 15 137 885 50 r n 9/8/29 12.0 33.9 8.34 15 138 881 00 r n 9/12/29 12.0 33.9 8.34 15 139 883 100 r n 9/12/29 12.0 33.9 8.34 15 131 883 100 r n 9/8/29 12.0 33.9 8.34 15 135 882 100 r n 9/8/29 12.0 33.9 8.34 15 136 882 50 r n 9/8/29 12.0 33.9 8.34 6.34 151 33 886 1 00 r n 9/8/29 12.0 33.9 8.34 15 136 882 50 r n 9/8/29 12.0 33.9 8.34 6.34 140 885 100 r n 9/8/29 12.0 33.9 8.34 6.34 140 886 100 r n 9/8/29 12.0 33.9 8.34 151 338 880 100 r n 9/8/29 12.0 33.9 8.34 151 338 880 100 r n 9/8/29 12.0 33.9 8.34 151 338 880 100 r n 9/8/29 12.0 33.9 8.34 151 338 880 100 r n 9/8/29 12.0 33.9 8.34 151 338  | Station | Sample | Depth (m) | Relative     | Appa- | Date     | Temperature (°C) | Salinity<br>(0/00) | pН   | PO4<br>mg/m3 |
| $ \begin{array}{c} 114 & 689 & 100 & \text{oc} & \text{n} & 6/27/29 & 13.0 & 34.5 & 8.00 & 91 \\ 115 & 689 & 0 & \text{r} & \text{n} & 6/29/29 & 20.6 & 34.6 & 8.19 & 41.15 \\ 689 & 50 & \text{r} & \text{n} & 6/29/29 & 20.6 & 34.6 & 8.19 & 41.17 \\ 789 & 50 & \text{r} & \text{n} & 6/29/29 & 12.5 & 34.6 & 8.19 & 41.17 \\ 117 & 789 & 50 & \text{r} & \text{n} & 7/25/29 & 12.5 & 34.6 & 8.12 & 29.11 \\ 128 & 770 & 50 & \text{r} & \text{n} & 7/25/29 & 12.5 & 34.6 & 8.12 & 29.11 \\ 129 & 780 & 0 & \text{r} & \text{n} & 7/25/29 & 12.5 & 34.6 & 8.12 & 29.11 \\ 130 & 781 & 0 & \text{oc} & \text{n} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 130 & 784 & 0 & \text{oc} & \text{n} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 130 & 785 & 50 & \text{r} & \text{p} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 130 & 785 & 50 & \text{r} & \text{p} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 130 & 785 & 100 & \text{r} & \text{p} & 9/4/29 & 18.2 & 33.4 & 8.34 & 36.13 \\ 131 & 789 & 100 & \text{c} & \text{n} & 9/4/29 & 18.2 & 33.4 & 8.34 & 36.13 \\ 131 & 789 & 100 & \text{c} & \text{n} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 131 & 799 & 0 & \text{oc} & \text{n} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 131 & 799 & 0 & \text{oc} & \text{n} & 9/4/29 & 16.2 & 33.4 & 8.34 & 36.13 \\ 132 & 789 & 50 & \text{r} & \text{n} & 9/8/29 & 11.3 & 33.4 & 8.34 & 36.13 \\ 132 & 789 & 100 & \text{oc} & \text{n} & 9/8/29 & 11.3 & 33.4 & 8.34 & 36.13 \\ 132 & 789 & 100 & \text{oc} & \text{n} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 132 & 789 & 100 & \text{oc} & \text{n} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 132 & 801 & 100 & \text{r} & \text{p} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 132 & 803 & 100 & \text{r} & \text{p} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 133 & 805 & 50 & \text{r} & \text{n} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 134 & 809 & 50 & \text{r} & \text{n} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 134 & 809 & 50 & \text{r} & \text{n} & 9/8/29 & 11.6 & 3.33 & 8.34 & 1.5 \\ 134 & 809 & 50 & \text{r} & \text{n} & 9/10/29 & 20.8 & 34.7 & 8.34 & 6.1 \\ 134 & 809 & 50 & \text{r} & \text{n} & 9/10/29 & 20.8 & 34.7 & 8.34 & 6.1 \\ 134 & 809 & 50 & \text{r} & \text{n} & 9/10/29 & 21.5 & 33.4 & 8.34 & 6.1 \\ 135 & 825 & 50 & \text{r} & \text{n} & 9/10/29 & 21.5 & 33.4 & 8.34 & 6.1 \\ 136 & 828 & 50 & \text{r} & \text{n} & 9/10/29 & 22.8 & 34.7$ |         |        | 1         |              |       |          | 1                |                    |      |              |
| 114 689 0 oc p 6,27/28 19.9 34.3 8.15 7 115 682 0 r n 6,28/29 20.6 34.6 8.19 4 115 683 50 r n 6,78/29 17.5 34.6 8.19 17 118 779 50 r n 6,78/29 17.5 34.6 8.19 17 118 7780 0 o r n 7/3/28 16.3 34.6 8.12 17 118 7780 0 o r n 7/3/28 16.4 33.1 8.15 25 130 781 0 o c n 7/4/29 16.2 33.4 8.34 35 130 784 0 o c p 9,4/29 16.2 33.4 8.34 36 130 785 50 r p 9,4/29 16.2 33.4 8.34 36 130 787 0 o c n 9,4/29 16.2 33.4 8.36 36 130 787 0 o c n 9,4/29 16.2 33.4 8.36 36 131 789 100 o c n 9,4/29 16.2 33.4 8.36 36 131 789 100 o c n 9,4/29 16.2 33.4 8.34 36 131 789 100 o c n 9,4/29 11.7 33.4 8.36 36 131 789 100 o c n 9,6/29 12.1 33.4 8.34 36 131 789 100 o c n 9,6/29 12.1 33.4 8.34 36 131 789 100 o c n 9,8/29 12.1 33.4 8.34 36 131 789 100 o c n 9,8/29 12.0 33.9 8.34 15 132 799 100 o c n 9,8/29 11.6 3 33.9 8.34 15 132 799 50 r n 9,8/29 11.6 3 33.9 8.34 15 132 799 100 o c n 9,8/29 11.6 3 33.9 8.34 15 132 802 50 r n 9,8/29 11.6 3 33.9 8.34 15 132 803 100 r n 9,8/29 11.6 3 33.9 8.34 15 132 803 100 r n 9,8/29 11.6 3 33.9 8.34 15 132 804 10 r n 9,8/29 11.6 3 33.9 8.34 15 133 880 50 r n 9,8/29 11.6 3 33.9 8.34 15 134 80 6 50 r n 9,8/29 11.8 3 33.4 8.30 16 134 80 6 50 r n 9,8/29 11.8 3 33.4 8.30 16 134 80 6 50 r n 9,8/29 11.8 3 33.4 8.30 16 134 80 6 50 r n 9,8/29 11.8 3 33.4 8.30 16 134 80 6 50 r n 9,8/29 11.8 3 33.4 8.30 16 134 80 6 50 r n 9,8/29 11.8 3 33.4 8.30 16 135 821 50 r n 9,8/29 11.8 3 33.4 8.30 16 136 822 100 r n 9,8/29 12.0 33.9 8.34 15 137 836 0 r n 9,8/29 13.8 33 39 8.34 15 138 825 50 r n 9,8/29 13.8 33 39 8.34 15 139 850 10 r n 9,8/29 13.8 33 39 8.34 15 139 850 0 r n 9,8/29 13.8 33 39 8.34 15 139 850 0 r n 9,8/29 13.8 33 39 8.34 15 139 850 0 r n 9,8/29 13.8 33 39 8.34 15 139 851 100 r n 9,8/29 13.8 33 39 8.34 15 139 851 100 r n 9,8/29 13.8 33 39 8.34 15 139 851 100 r n 9,8/29 13.8 33 39 8.34 15 139 851 100 r n 10/29 12.9 8.8 34 8.3 80 16 139 851 100 r n 10/29 12.9 8.8 34 8.3 80 16 139 851 100 r n 10/29 12.9 8.8 34 8.3 8 35 8.3 16 139 851 100 r n 10/29 12.9 8 34 8 34 8 8 34 8 8 8 8 8 8 8 8 8 8 8  |         |        |           |              |       |          |                  |                    |      |              |
| 115 692 0 r n 6 6 22 / 29 20.6 34.6 8.19 4 117 709 50 r n 6 6 22 / 29 20.6 34.6 8.19 17 117 709 50 r n 7 / 3 / 29 12.5 34.6 8.12 17 117 709 50 r n 7 / 3 / 29 12.5 34.6 8.12 21 17 18 / 20 0 0 r n 7 / 3 / 29 12.5 34.6 8.12 21 17 18 / 20 0 0 r n 7 / 3 / 29 12.5 34.6 8.12 21 17 18 / 20 0 0 r n 7 / 3 / 29 16.2 33.4 8.34 8.3 18 13 0 7 8 10 0 r n 9 / 4 / 29 16.2 33.4 8.34 8.3 18 13 0 7 8 10 0 r p 9 / 4 / 29 16.2 33.4 8.34 8.3 18 13 0 7 8 5 50 r p 9 / 4 / 29 16.2 33.4 8.34 8.3 18 13 0 7 8 5 50 r p 9 / 4 / 29 16.2 33.4 8.34 8.3 18 13 0 7 8 5 50 r p 9 / 4 / 29 16.2 33.4 8.34 8.3 13 0 7 8 10 0 r p 9 / 4 / 29 16.2 33.4 8.34 8.3 18 13 0 7 8 10 0 r p 9 / 4 / 29 16.2 33.4 8.34 8.3 18 13 13 1 7 28 10 0 oc n 8 / 6 / 29 21 1.7 33.4 8.34 8.3 18 13 13 1 7 28 10 0 oc n 8 / 6 / 29 21 1.2 33.4 8.34 8.3 1.5 13 13 1 7 28 10 0 oc n 8 / 6 / 29 21 1.2 33.4 8.34 8.3 1.5 13 13 1 7 28 10 0 oc n 9 / 9 / 6 / 29 10.3 33.4 8.34 1.5 13 13 1 7 28 10 0 oc n 9 / 9 / 6 / 29 10.3 33.9 8.33 19 13 13 1 7 28 10 0 oc n 9 / 9 / 6 / 29 10.3 33.9 8.33 19 13 13 1 7 28 10 0 oc n 9 / 9 / 8 / 29 21 1.0 33.9 8.33 19 13 13 1 7 28 10 0 oc n 9 / 9 / 8 / 29 21 1.0 33.9 8.33 19 13 13 1 7 28 801 5 0 r r n 9 / 8 / 29 21 1.0 33.9 8.33 19 13 13 1 7 28 801 5 0 r r n 9 / 8 / 29 21 1.0 33.9 8.33 19 13 13 13 13 13 13 13 13 13 13 13 13 13   |         |        |           |              |       |          |                  |                    |      |              |
| 117 709 50 r n 7/3/29 12.5 34.2 8.06 51 129 780 0 r n 7/27/29 16.3 33.0 8.12 29 129 780 0 r n 7/27/29 16.3 33.1 8.13 25 130 781 0 0 c n 9/4/29 16.2 33.4 8.34 36 130 785 55 0 c p 9 4/29 16.2 33.4 8.34 8.36 130 787 0 c n 9/4/29 16.2 33.4 8.34 8.36 130 787 0 c n 9/4/29 18.2 33.4 8.34 8.36 131 792 0 0 c n 9/4/29 18.2 33.4 8.34 8.34 131 792 0 0 c p 9/4/29 18.2 33.4 8.34 8.34 131 792 0 0 c p 9/4/29 18.2 33.4 8.34 8.34 131 792 0 0 c n 9/6/29 12.1 33.4 8.34 8.34 131 792 0 0 c n 9/6/29 18.2 33.4 8.34 8.36 131 792 0 0 c n 9/6/29 18.2 33.4 8.34 8.36 131 792 0 0 c n 9/6/29 18.2 33.4 8.34 8.34 132 797 0 0 c n 9/6/29 11.3 33.4 8.34 8.31 132 803 100 r p 9/8/29 21.0 33.9 8.33 19 132 803 100 r p 9/8/29 21.0 33.9 8.33 19 132 803 100 r p 9/8/29 11.6 33.9 8.33 19 132 803 100 r p 9/8/29 11.6 33.9 8.33 19 133 805 50 r n 9/1/29 20.8 34.7 8.34 6.34 134 808 0 0 c n 9/1/29 20.8 34.7 8.34 6.34 134 809 50 r n 9/1/29 22.9 8.34 8.34 6.34 135 822 100 r p 9/8/29 11.3 33.4 8.34 6.34 134 809 50 r n 9/1/29 22.9 8.34 7.8 8.34 6.34 135 822 100 r r n 9/1/29 22.9 8.37 8.35 16 135 822 100 r r n 9/1/29 22.9 8.37 8.36 6.37 136 828 50 r r n 9/1/29 22.9 8.37 8.36 6.37 137 836 0 r r n 9/1/29 22.9 8.34 7.8 8.34 6.34 138 838 100 r r n 9/1/29 22.9 8.34 7.8 8.34 6.34 139 830 5 50 r n 9/1/29 22.9 8.34 7.8 8.37 6.6 139 832 0 r r n 9/1/29 22.9 8.34 7.8 8.34 6.36 139 830 50 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 139 830 50 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 139 830 50 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 139 830 50 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 139 830 50 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 130 838 50 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 130 838 50 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 7.8 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 8.34 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 8.34 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 8.34 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 8.34 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 8.34 8.34 6.36 131 83 83 100 0 r n 9/1/29 22.9 8.34 8.34 8.34 6.36 130 83 83 100 0   |         |        |           |              |       |          |                  |                    |      |              |
| 128   |         |        |           | r            | n     |          |                  |                    |      |              |
| 129   |         |        |           |              |       | 7/ 3/29  |                  |                    |      |              |
| 130   |         |        |           |              |       |          |                  |                    |      |              |
| 130   |         |        |           |              |       |          |                  |                    |      |              |
| 130   |         |        |           |              |       |          |                  |                    |      |              |
| 130   |         |        |           | r            |       |          | 11.7             | 33.4               | 8.26 | 83           |
| 131   |         |        |           |              |       | 9/ 4/29  |                  |                    |      |              |
| 131   |         |        |           |              |       |          |                  |                    |      |              |
| 131   |         |        |           |              |       |          |                  |                    |      |              |
| 132   |         |        |           |              |       | 9/6/29   |                  |                    |      |              |
| 132   |         |        |           |              |       | 9/8/29   |                  | 33.9               | 8.34 |              |
| 132   801   0   r   p   9/8/29   21.0   33.9   8.34   15     132   803   100   r   p   9/8/29   17.6   33.9   8.33   19     133   805   50   r   n   9/10/29   20.8   34.7   8.37   7     134   808   0   0   0   0   n   9/12/29   22.9   34.7   8.34   6     134   810   100   r   n   9/12/29   19.8   34.6   8.34   6     134   810   100   r   n   9/12/29   19.8   34.6   8.34   6     134   815   0   r   n   9/12/29   18.1   34.6   8.34   6     135   821   50   r   n   9/12/29   18.7   34.8   8.34   5     135   822   100   r   n   9/14/29   21.5   35.0   8.37   5     135   822   50   r   n   9/14/29   21.5   35.0   8.37   5     135   822   50   r   n   9/14/29   21.5   35.0   8.37   5     136   832   0   r   n   9/16/29   24.6   35.4   8.39   3     136   832   0   r   n   9/16/29   24.6   35.4   8.39   3     137   836   0   r   n   9/22/29   25.8   34.9   8.31   6     140   858   100   r   n   9/22/29   25.8   34.9   8.31   6     140   858   100   r   n   9/22/29   25.8   34.9   8.31   6     141   865   50   r   n   10/5/29   24.8   35.3   8.34   7     142   873   50   0   0   0   n   10/7/29   21.8   34.8   8.30   5     142   874   100   0   0   n   10/7/29   21.8   34.8   8.30   5     142   877   50   r   n   10/9/29   21.8   34.8   8.30   5     143   883   100   r   n   10/9/29   21.8   34.8   8.30   5     143   883   100   r   n   10/9/29   21.8   34.8   8.30   5     143   883   100   r   n   10/9/29   22.4   34.9   8.30   6     145   891   50   r   n   10/9/29   22.4   34.9   8.30   6     145   891   50   r   n   10/18/29   22.4   34.9   8.30   6     146   897   50   r   n   10/18/29   22.4   34.9   8.30   6     146   898   100   oc   n   10/18/29   22.4   34.9   8.30   6     146   898   100   oc   n   10/18/29   22.4   34.9   8.30   6     146   897   50   r   n   10/18/29   22.4   34.9   8.30   6     146   898   100   oc   n   10/18/29   22.4   34.9   8.30   6     146   898   100   oc   n   10/28/29   22.8   34.4   8.30   6     147   904   50   r   n   10/18/29   22.8   34.4   8.30   6     149   927   0   r   |         |        |           |              |       |          |                  |                    |      |              |
| 132   802   50  |         |        |           |              |       |          |                  |                    |      |              |
| 132   |         |        |           |              |       |          |                  |                    |      | 10           |
| 133   |         |        |           |              |       |          |                  |                    |      |              |
| 134   |         |        | 50        |              |       |          |                  | 34.7               | 8.37 | 7            |
| 134   |         |        |           |              |       |          |                  |                    |      |              |
| 134   |         |        |           |              |       | 9/12/29  |                  |                    |      | 6            |
| 137   |         |        |           |              |       |          |                  |                    |      | 6            |
| 137   |         |        |           |              |       |          |                  |                    |      | 5            |
| 137   |         |        |           | $\mathbf{r}$ | n     |          |                  |                    |      | 5            |
| 137   |         |        |           |              |       |          |                  |                    |      | 5            |
| 137   |         |        |           |              |       |          |                  |                    |      | 3            |
| 143       881       0       r       n       10/9/29       13.8       34.4       8.30       6         143       885       50       r       n       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       25.6   |         |        |           |              |       |          |                  |                    |      |              |
| 143       881       0       r       n       10/9/29       13.8       34.4       8.30       6         143       885       50       r       n       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       25.6   |         |        |           |              |       | 9/22/29  |                  |                    | 8.31 | 6            |
| 143       881       0       r       n       10/9/29       13.8       34.4       8.30       6         143       885       50       r       n       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       25.6   |         |        |           |              |       | 9/22/29  |                  |                    |      | 6            |
| 143       881       0       r       n       10/9/29       13.8       34.4       8.30       6         143       885       50       r       n       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       25.6   |         |        |           |              |       |          |                  |                    |      | 7 -          |
| 143       881       0       r       n       10/9/29       13.8       34.4       8.30       6         143       885       50       r       n       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       25.6   |         |        |           |              |       |          |                  |                    |      | 5            |
| 143       881       0       r       n       10/9/29       13.8       34.4       8.30       6         143       885       50       r       n       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       25.6   |         |        |           |              |       |          |                  |                    |      | 7            |
| 143       883       100       r       n       10/9/29       13.8       34.1       8.30       10         143       885       50       r       p       10/9/29       19.0       34.2       8.34       6         146       896       0       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         147       904       50       r       n       10/17/29       23.1       35.3       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.37       6         149       927       0       r       n       10/23/29       23.5       35.0       8.37       6         150       931       100       c       n       10/23/29       25.6 </td <td></td> <td></td> <td></td> <td>r</td> <td>p</td> <td>10/ 7/29</td> <td></td> <td></td> <td></td> <td>5</td>  |         |        |           | r            | p     | 10/ 7/29 |                  |                    |      | 5            |
| 143       885       50       r       p       10/9/29       19.0       34.2       8.34       6         145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       897       50       r       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         147       904       50       r       n       10/15/29       23.1       34.3       8.26       7         149       921       50       r       n       10/21/29       23.3       35.0       8.37       6         149       921       50       r       n       10/21/29       23.5       35.0       8.34       6         150       929       0       r       n       10/23/29       25.6       34.7       8.39       7         150       930       50       oc       n       10/23/29       22.8       34.8       8.35       10         151       937       0       oc       n       10/26/29       26.0   |         |        |           |              |       |          |                  |                    |      |              |
| 145       891       50       r       n       10/13/29       18.7       34.3       8.34       6         146       896       0       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       927       0       r       n       10/21/29       23.3       35.0       8.37       6         149       927       0       r       p       10/21/29       23.5       35.0       8.34       6         150       929       0       r       n       10/23/29       25.6       34.7       8.39       7         150       931       100       oc       n       10/23/29       25.6       34.7       8.39       7         151       937       0       oc       n       10/23/29       19.6       34.6       8.32       11         151       938       50       oc       n       10/23/29       19.6   |         |        |           |              |       |          |                  |                    |      |              |
| 146       896       0       r       n       10/15/29       22.4       34.9       8.37       6         146       897       50       r       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/15/29       19.7       34.3       8.26       7         149       921       50       r       n       10/17/29       23.1       35.3       8.29       5         149       921       50       r       n       10/21/29       23.5       35.0       8.37       6         150       929       0       r       n       10/21/29       23.5       35.0       8.34       6         150       929       0       r       n       10/23/29       25.6       34.7       8.39       7         150       930       50       oc       n       10/23/29       25.6       34.7       8.39       7         150       931       100       oc       n       10/23/29       28.0       34.8       8.35       10         151       938       50       oc       n       10/26/29       26.0   |         |        |           |              |       |          |                  |                    |      | 6            |
| 146       898       100       oc       n       10/15/29       19.7       34.3       8.26       7         147       904       50       r       n       10/17/29       23.1       35.3       8.29       7         149       927       0       r       p       10/21/29       23.5       35.0       8.34       6         150       929       0       r       n       10/23/29       25.6       34.7       8.39       7         150       931       100       oc       n       10/23/29       22.8       34.8       8.35       10         150       931       100       oc       n       10/26/29       26.0       34.6       8.32       11         151       937       0       oc       n       10/26/29       26.0       34.0           151       938       50       oc       n       10/26/29       28.0       34.4           151       943       0       r       p       10/26/29       26.0       34.0           152       945       50       oc       n       10/27/29  |         |        | 0         |              | n     | 10/15/29 | 22.4             | 34.9               | 8.37 | 6            |
| 147       904       50       r       n       10/17/29       23.1       35.3       8.29       5         149       927       0       r       n       10/21/29       23.3       35.0       8.37       6         150       929       0       r       n       10/23/29       25.6       34.7       8.39       7         150       930       50       oc       n       10/23/29       22.8       34.8       8.35       10         150       931       100       oc       n       10/23/29       19.6       34.6       8.32       11         151       937       0       oc       n       10/28/29       28.0       34.0           151       938       50       oc       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       18.3       34.4           151       941       0       r       r       n <td< td=""><td></td><td></td><td>50</td><td></td><td></td><td></td><td></td><td></td><td></td><td>. 6</td></td<>   |         |        | 50        |              |       |          |                  |                    |      | . 6          |
| 149       921       50       r       n       10/21/29       23.3       35.0       8.37       6         149       927       0       r       p       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       22.8       34.8       8.35       10         150       931       100       oc       n       10/23/29       19.6       34.6       8.32       11         151       937       0       oc       n       10/26/29       18.3       34.4           151       938       50       oc       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       18.3       34.4           151       941       0       r       p       10/26/29       26.0       34.0            152       945       50       oc       n  |         |        | 100       |              |       |          |                  |                    |      | 7            |
| 149       927       0       r       p       10/21/29       23.5       35.0       8.34       6         150       930       50       oc       n       10/23/29       22.8       34.8       8.39       7         150       931       100       oc       n       10/23/29       19.6       34.6       8.32       11         151       937       0       oc       n       10/26/29       28.0       34.0           151       938       50       oc       n       10/26/29       12.5       34.6           151       939       100       r       n       10/26/29       12.5       34.6            151       941       0       r       p       10/26/29       12.5       34.6            152       944       0       oc       n       10/27/29       27.4       33.7       8.35       20         152       945       50       oc       n       10/27/29       11.4       34.7       7.76       75       152       948       0       r       p       10  |         |        |           |              |       |          |                  |                    |      | 6            |
| 150       929       0       r       n       10/23/29       25.6       34.7       8.39       7         150       930       50       oc       n       10/23/29       19.6       34.8       8.35       10         150       931       100       oc       n       10/26/29       19.6       34.6       8.32       11         151       937       0       oc       n       10/26/29       26.0       34.0           151       938       50       oc       n       10/26/29       12.5       34.6           151       939       100       r       n       10/26/29       12.5       34.6           151       941       0       r       p       10/26/29       26.0       34.0           152       944       0       oc       n       10/27/29       27.4       33.7       8.35       20         152       946       100       r       n       10/27/29       11.4       34.7       7.76       75         152       948       0       r       p       10/27/29   |         |        |           |              | g     | 10/21/29 | 23.5             |                    |      | 6            |
| 150 931 100 oc n 10/23/29 19.6 34.6 8.32 11 151 937 0 oc n 10/26/29 26.0 34.0 151 938 50 oc n 10/26/29 18.3 34.4 151 939 100 r n 10/26/29 12.5 34.6 151 941 0 r p 10/26/29 26.0 34.0 152 944 0 oc n 10/27/29 27.4 33.7 8.35 20 152 945 50 oc n 10/27/29 14.2 34.5 7.87 53 152 946 100 r n 10/27/29 11.4 34.7 7.76 75 152 948 0 r p 10/27/29 27.4 33.7 8.35 20 153 951 0 oc n 10/27/29 27.4 33.7 8.35 20 153 951 0 oc n 10/27/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.2 8.47 7 153 953 100 oc n 10/29/29 28.1 34.2 8.47 7 153 955 50 r n 10/29/29 20.5 34.7 8.28 31 154 959 50 r n 10/29/29 20.5 34.7 8.28 31 154 959 50 r n 10/31/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 967 100 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 973 50 r n 11/4/29 27.2 35.0 8.30 35 156 973 50 r n 11/4/29 27.0 35.1 8.37 46 156 974 100 oc n 11/4/29 27.0 35.1 8.37 46 157 978 0 oc n 11/4/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 158 983 0 c n 11/8/29 28.2 35.6 8.34 36  |         |        |           | r            | n     |          |                  |                    |      | 7            |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |         |        |           |              |       |          |                  |                    |      |              |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |         |        |           |              |       |          |                  |                    |      |              |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |         |        |           |              |       |          | 18.3             |                    |      |              |
| 152       944       0       oc       n       10/27/29       27.4       33.7       8.35       20         152       946       100       r       n       10/27/29       11.4       34.7       7.76       75         152       948       0       r       p       10/27/29       27.4       33.7       8.35       20         153       951       0       oc       n       10/29/29       28.1       34.2       8.47       7         153       952       50       r       n       10/29/29       28.1       34.2       8.47       7         153       953       100       oc       n       10/29/29       28.1       34.4       8.39       7         153       953       100       oc       n       10/29/29       20.5       34.7       8.28       31         154       959       50       r       n       n       10/29/29       20.5       34.7       8.28       31         155       965       0       r       n       11/2/29       27.8       34.9       8.29       29         155       966       50       r       n       11/2/29 <td>151</td> <td>939</td> <td>100</td> <td></td> <td>n</td> <td>10/26/29</td> <td>12.5</td> <td></td> <td>****</td> <td></td>   | 151     | 939    | 100       |              | n     | 10/26/29 | 12.5             |                    | **** |              |
| 152 945 50 oc n 10/27/29 14.2 34.5 7.87 53 152 946 100 r n 10/27/29 11.4 34.7 7.76 75 152 948 0 r p 10/27/29 27.4 33.7 8.35 20 153 951 0 oc n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 153 953 100 oc n 10/29/29 28.1 34.4 8.39 7 153 959 50 r n 10/29/29 20.5 34.7 8.28 31 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.0 35.1 8.37 46 156 974 100 oc n 11/4/29 27.0 35.1 8.37 46 156 974 100 oc n 11/4/29 27.1 35.3 8.27 47 157 978 0 oc n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 980 100 r n 11/6/29 27.1 35.2 8.32 60 157 980 100 r n 11/6/29 26.8 35.5 8.30 64 158 983 0 c n 11/8/29 28.2 35.6 8.34 36   |         |        |           |              | E-    |          |                  |                    |      |              |
| 152 946 100 r n 10/27/29 11.4 34.7 7.76 75 152 948 0 r p 10/27/29 27.4 33.7 8.35 20 153 951 0 oc n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 153 953 100 oc n 10/29/29 20.5 34.7 8.28 31 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 967 100 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.0 35.1 8.37 46 156 974 100 oc n 11/4/29 27.0 35.1 8.37 46 157 978 0 oc n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.2 8.32 60 157 980 100 r n 11/6/29 27.1 35.2 8.32 60 157 980 100 r n 11/6/29 26.8 35.5 8.30 64  |         |        |           |              |       |          |                  |                    |      |              |
| 152 948 0 r p 10/27/29 27.4 33.7 8.35 20 153 951 0 oc n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 153 953 100 oc n 10/29/29 20.5 34.7 8.28 31 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.8 34.9 8.29 29 155 967 100 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 r n 11/4/29 27.2 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.0 35.1 8.37 46 156 974 100 oc n 11/4/29 27.0 35.1 8.37 46 157 978 0 oc n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 980 100 r n 11/6/29 27.1 35.2 8.32 60 157 980 100 r n 11/6/29 26.8 35.5 8.30 64 158 983 0 c n 11/8/29 28.2 35.6 8.34 36  |         |        |           |              |       |          |                  |                    |      |              |
| 153   |         |        | 0         |              | р     | 10/27/29 | 27.4             | 33.7               | 8.35 | 20           |
| 153 953 100 oc n 10/29/29 20.5 34.7 8.28 31<br>154 959 50 r n 10/31/29 28.2 34.2 8.40 7<br>155 965 0 r n 11/2/29 27.8 34.9 8.29 29<br>155 966 50 r n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.2 35.0 8.30 35<br>156 972 0 r n 11/4/29 27.6 35.0 8.34 28<br>156 973 50 r n 11/4/29 27.6 35.0 8.34 28<br>156 974 100 oc n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 oc n 11/4/29 27.0 35.1 8.37 46<br>157 978 0 oc n 11/6/29 27.1 35.3 8.27 47<br>157 979 50 r n 11/6/29 27.1 35.3 8.27 47<br>157 980 100 r n 11/6/29 27.1 35.2 8.32 60<br>157 980 100 r n 11/6/29 27.1 35.2 8.32 60<br>158 983 0 c n 11/8/29 28.2 35.6 8.34 36  | 153     |        |           | ос           | n     |          |                  |                    |      | 7            |
| 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 r n 11/2/29 27.8 34.9 8.29 29 155 966 50 r n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 974 100 oc n 11/4/29 27.0 35.1 8.37 46 156 974 100 oc n 11/4/29 27.0 35.1 8.37 46 157 978 0 oc n 11/6/29 27.1 35.3 8.27 47 157 979 50 r n 11/6/29 27.1 35.3 8.27 47 157 980 100 r n 11/6/29 27.1 35.2 8.32 60 157 980 100 r n 11/6/29 27.1 35.2 8.32 60 158 983 0 c n 11/8/29 28.2 35.6 8.34 36   |         |        |           |              |       |          |                  |                    |      |              |
| 155 965 0 r n 11/2/29 27.8 34.9 8.29 29<br>155 966 50 r n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.2 35.0 8.30 35<br>156 972 0 r n 11/4/29 27.6 35.0 8.34 28<br>156 973 50 r n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 oc n 11/4/29 27.0 35.1 8.37 46<br>157 978 0 oc n 11/4/29 26.4 35.1 8.30 48<br>157 979 50 r n 11/6/29 27.1 35.3 8.27 47<br>157 979 50 r n 11/6/29 27.1 35.3 8.27 47<br>157 980 100 r n 11/6/29 27.1 35.2 8.32 60<br>158 983 0 c n 11/8/29 28.2 35.6 8.34 36  |         |        |           |              |       |          |                  |                    |      |              |
| 155 966 50 r n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.2 35.0 8.30 35<br>156 972 0 r n 11/4/29 27.6 35.0 8.34 28<br>156 973 50 r n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 oc n 11/4/29 27.0 35.1 8.37 46<br>157 978 0 oc n 11/4/29 26.4 35.1 8.30 48<br>157 979 50 r n 11/6/29 27.1 35.3 8.27 47<br>157 979 50 r n 11/6/29 27.1 35.3 8.27 47<br>157 980 100 r n 11/6/29 27.1 35.2 8.32 60<br>157 980 100 r n 11/6/29 26.8 35.5 8.30 64<br>158 983 0 c n 11/8/29 28.2 35.6 8.34 36  |         |        |           |              | · n   | 11/ 2/29 |                  |                    |      |              |
| 155     967     100     oc     n     11/2/29     27.2     35.0     8.30     35       156     972     0     r     n     11/4/29     27.6     35.0     8.34     28       156     973     50     r     n     11/4/29     27.0     35.1     8.37     46       156     974     100     oc     n     11/4/29     26.4     35.1     8.30     48       157     978     0     oc     n     11/6/29     27.1     35.3     8.27     47       157     979     50     r     n     11/6/29     27.1     35.2     8.32     60       157     980     100     r     n     11/6/29     26.8     35.5     8.30     64       158     983     0     c     n     11/8/29     28.2     35.6     8.34     36  |         |        |           |              | n     | 11/ 2/29 | 27.7             | 34.9               | 8.30 | 30           |
| 156     973     50     r     n     11/4/29     27.0     35.1     8.37     46       156     974     100     oc     n     11/4/29     26.4     35.1     8.30     48       157     978     0     oc     n     11/6/29     27.1     35.3     8.27     47       157     979     50     r     n     11/6/29     27.1     35.2     8.32     60       157     980     100     r     n     11/6/29     26.8     35.5     8.30     64       158     983     0     c     n     11/8/29     28.2     35.6     8.34     36   | 155     |        |           | oc           | n     | 11/ 2/29 |                  |                    |      |              |
| 156     974     100     oc     n     11/4/29     26.4     35.1     8.30     48       157     978     0     oc     n     11/6/29     27.1     35.3     8.27     47       157     979     50     r     n     11/6/29     27.1     35.2     8.32     60       157     980     100     r     n     11/6/29     26.8     35.5     8.30     64       158     983     0     c     n     11/8/29     28.2     35.6     8.34     36  |         |        |           |              | n     | 11/4/29  |                  |                    |      |              |
| 157     978     0     oc     n     11/6/29     27.1     35.3     8.27     47       157     979     50     r     n     11/6/29     27.1     35.2     8.32     60       157     980     100     r     n     11/6/29     26.8     35.5     8.30     64       158     983     0     c     n     11/8/29     28.2     35.6     8.34     36   |         |        |           |              | n     | 11/4/29  |                  |                    |      |              |
| 157 979 50 r n 11/6/29 27.1 35.2 8.32 60<br>157 980 100 r n 11/6/29 26.8 35.5 8.30 64<br>158 983 0 c n 11/8/29 28.2 35.6 8.34 36  |         |        |           |              | n     | 11/ 6/29 |                  |                    |      |              |
| 158 983 0 c n 11/8/29 28.2 35.6 8.34 36   |         |        |           |              | n     | 11/ 6/29 | 27.1             | 35.2               | 8.32 | 60           |
|   | 157     | 980    | 100       | r            | n     | 11/ 6/29 |                  |                    |      |              |
| 136 364 3U OC n 11/ 0/29 26.2 33.0 6.39 3U  |         |        |           |              |       |          |                  |                    |      |              |
|   | 198     | 984    | อบ        | oc           | n     | 11/ 0/29 | 40.4             | 30.0               | 0.08 | 30           |

Table 5. Distributional and environmental records for Ceratium candelabrum--Concluded

| Station                                | Sample                                   | Depth (m)                          | Relative abundance                | Appa-<br>ratus             | Date   | Temperature<br>(°C)                                  | Salinity<br>(o/oo)                                   | pН   | PO4<br>mg/m <sup>3</sup>         |
|--|--|------------------------------------|-----------------------------------|----------------------------|--|--|--|--|----------------------------------|
| 158<br>159<br>159<br>159<br>160<br>160 | 985<br>990<br>991<br>992<br>1000<br>1002 | 100<br>50<br>100<br>0<br>50<br>100 | c<br>oc<br>r<br>r<br>r<br>oc<br>r | n<br>n<br>n<br>n<br>n<br>n | 11/ 8/29<br>11/11/29<br>11/11/29<br>11/11/29<br>11/13/29<br>11/13/29<br>11/13/29 | 27.6<br>28.6<br>28.5<br>28.0<br>28.6<br>28.6<br>28.5 | 35.9<br>35.7<br>35.7<br>35.7<br>35.6<br>35.6<br>35.7 | 8.39<br>8.37<br>8.39<br>8.37<br>8.37<br>8.39<br>8.44 | 48<br>15<br>15<br>23<br>12<br>15 |

Table 6. Distributional and environmental records for Ceratium furca Ehrenbergi

|          | I debic o.      | 271002100 | cional and cir     | var Olland     |                                  | ib ioi ociatiani    | Iui ca Liii        | cubor 6.                     |                  |
|----------|-----------------|-----------|--------------------|----------------|----------------------------------|---------------------|--------------------|------------------------------|------------------|
| Station  | Sample          | Depth (m) | Relative abundance | Appa-<br>ratus | Date                             | Temperature<br>(°C) | Salinity<br>(o/oo) | рН                           | PO4<br>mg/m3     |
| 5a       | 33              | 0         | С                  | n              | 5/30/28                          | (12.4               | 35.6               | 8.15                         | 21)              |
| 5a       | 34              | 0         | r                  | n              | 5/30/28                          | (12.4               | 35.6               | 8.15                         | 21)<br>21)       |
| 6        | 35              | 0         | С                  | n              | 5/31/28<br>5/31/28               | 12.4                | 35.6               | 8.15                         | 21               |
| 6        | 36              | 50        | С                  | n              | 5/31/28                          | 11.6                | 35.6               | 8.12                         | 32               |
| 6        | 37              | 100       | С                  | n              | 5/31/28                          | 11.3                | 35.6               | 8.08                         | 41               |
| 6a<br>6b | 42<br>43        | 0         | c                  | n              | 5/31/28<br>6/ 2/28<br>6/ 2/28    | (12.4<br>(12.4      | 35.6<br>35.6       | 8.1 <b>5</b><br>8.1 <b>5</b> | 21)              |
| 6b       | 44              | 0         | c<br>oc            | n<br>n         | 6/2/28                           | (12.4               | 35.6               | 8.15                         | 21)<br>21)       |
| 6b       | 45              | ŏ         | oc                 | n              | 6/ 2/28                          | (12.4               | 35.6               | 8.15                         | 21)              |
| 6b       | 46              | Õ         | c                  | n              | 6/ 2/28                          | (12.4               | 35.6               | 8.15                         | 21)              |
| 6c       | 47              | 100       | c                  | n              | 6/ 2/28<br>6/ 2/28               | (11.3               | 35.6               | 8.08                         | 41)              |
| 6c       | 48              | 0         | ос                 | n              | 6/ 3/28                          | (12.4               | 35.6               | 8.15                         | 21)              |
| 6c       | 49              | 0         | c                  | n              | 6/ 4/28                          | (12.4               | 35.6               | 8.15                         | 21)              |
| 6c       | 52              | 0         | r                  | n              | 7/ 8/28                          | (10.6               | 35.4               | 8.12                         | 27)              |
| 6g<br>6h | 54              | 0         | С                  | n              | 7/10/28                          | (10.6               | 35.4               | 8.12                         | 27)              |
| on<br>7  | 55<br>57        | 50        | a                  | n              | 7/11/28                          | (10.6<br>8.2        | 35.4               | 8.12<br>8.03                 | 27)<br>47        |
| 7 7      | 58              | 100       | oc<br>r            | n<br>n         | 7/13/28<br>7/13/28               | 8.2                 | 35.2<br>35.2       | 8.03                         | 57               |
| e        | 59              | 0         | r                  | n              | 7/15/28                          | 10.3                | 35.2               | 7.93                         | 13               |
| 8        | 60              | 50        | r                  | n              | 7/15/28                          | 9.1                 | 35.2               | 7.95                         | 27               |
| 9        | 64              | 0         | r                  | n              | 7/28/28                          | 11.2                | 35.1               | 8.08                         | 20               |
| 9        | 65              | 50        | oc                 | n              | 7/28/28                          | 8.4                 | 35.1               | 7.96                         | 55               |
| 9        | 66              | 100       | oc                 | n              | 7/28/28                          | 7.6                 | 35.1               | 7.98                         | 56               |
| 10       | 68              | 0         | oc                 | n              | 7/30/28                          | 10.9                | 34.9               | 8.08                         | 28               |
| 10<br>10 | 69<br><b>70</b> | 50<br>100 | r                  | n              | 7/30/28                          | 10.0                | 34.9               | 8.04                         | 34               |
| 11a      | 78              | 0         | oc<br>oc           | n<br>n         | 7/30/28                          | 6.6<br>(10.7        | 35.0<br>34.9       | 7.95<br>8.06                 | 52<br>27)        |
| 13a      | 89              | ő         | r                  | n              | 8/ 2/28<br>8/ 2/28               | 21.2                | 35.2               | 8.18                         | ii)              |
| 14       | 93              | ō         | r                  | p              | 8/ 9/28                          | (21.2<br>21.2       | 35.2               | 8.18                         | îī′              |
| 15       | 97              | 0         | r                  | p              | 8/11/28                          | 24.8                | 36.4               | 8.21                         | 11               |
| 16       | 105             | 100       | r                  | p              | 8/13/28<br>8/13/28               | 19.9                | 36.3               | 8.17                         | 13               |
| 16       | 108             | 100       | r                  | n              | 8/13/28                          | 19.9                | 36.3               | 8.17                         | 13               |
| 17<br>19 | 111<br>122      | 0         | r                  | n              | 8/15/28                          | 26.2<br>26.6        | 36.6<br>37.0       | 8.29<br>8.34                 | 9                |
| 20-21    | 131             | Ö         | r                  | n<br>n         | 8/20/28<br>8/23/28               | (26.6               | 36.3               | 8.32                         | 4)               |
| 21       | 134             | 100       | r                  | p              | 8/24/28                          | 21.0                | 36.8               | 8.20                         | $\hat{ar{	au}}'$ |
| 23       | 145             | 0         | oc                 | p              | 8/29/28                          | 27.2                | 35.9               | 8.25                         | 4                |
| 24       | 151             | 0         | r                  | p              | 8/31/28                          | 27.2                | 35.2               | 8.32                         | 4 4              |
| 24       | 156             | 100       | r                  | n              | 8/31/28<br>10/ 5/28              | 15.6                | 35.6               | 7.96                         | 99               |
| 32       | 194A            | 0         | r                  | p              | 10/ 5/28                         | 28.0                | 36.0               | 8.23                         | 2                |
| 40<br>40 | 232<br>233      | 50        | r                  | p              | 11/ 8/28<br>11/ 8/28<br>11/12/28 | 22.2<br>15.3        | 33.7<br>34.9       | 8.21<br>7.87                 | 24<br>161        |
| 41a      | 240             | 0         | r                  | p<br>n         | 11/12/28                         | (18.7               | 34.7               | 8.06                         | 45)              |
| 42       | 241             | ő         | r                  | n              | 11/13/28                         | 18.7                | 34.7               | 8.06                         | 45               |
| 42       | 242             | 50        | r                  | n              | 11/13/28<br>11/13/28             | 17.2                | 34.9               | 7.99                         | 68               |
| 42       | 243             | 100       | r                  | n              | 11/13/28                         | 13.8                | 35.0               | 7.91                         | 150              |
| 43       | 245             | 50        | oc                 | n              | 11/15/28                         | 17.0                | 34.9               | 7.93                         | 80               |
| 43       | 246             | 100       | oc                 | n              | 11/15/28                         | 13.6                | 35.0               | 7.90                         | 92               |
| 43<br>43 | 247<br>249      | 0<br>100  | r                  | p<br>p         | 11/15/28<br>11/15/28             | 19.6<br>13.6        | 34.8<br>35.0       | 8.09<br>7.90                 | 52<br>92         |
| 44       | 250             | 0         | r                  | n              | 11/17/28                         | 20.7                | 34.9               | 8.03                         | 38               |
| 44       | 251             | 50        | r                  | n              | 11/17/28                         | 20.4                | 34.9               | 8.04                         | 34               |
| 44       | 252             | 100       | r                  | n              | 11/17/28<br>11/17/28             | 13.8                | 35.0               | 7.85                         | 70               |
| 44       | 253             | 0         | oc                 | p              | 11/17/28                         | 20.7                | 34.9               | 8.03                         | 38               |
| 44       | 254             | 50        | r                  | p              | 11/17/28                         | 20.4                | 34.9               | 8.04                         | 34               |
| 45       | 257             | 50        | r                  | n              | 11/19/28<br>11/19/28             | 22.4                | 35.2               | 8.13                         | 46<br>50         |
| 45       | 258             | 100       | r                  | n              | 11/19/28                         | 18.6<br>22.4        | 35.1<br>35.3       | 8.00<br>8.12                 | 38               |
| 45<br>45 | 259<br>260      | 50-0      | r                  | p<br>p         | 11/19/28                         | 22.4                | 35.2               | 8.13                         | 46               |
| 46       | 263             | 100       | oc                 | n              | 11/21/28                         | 22.5                | 35.4               | 8.17                         | 40               |
|          |                 |           |                    |                |                                  |                     |                    |                              |                  |

Table 6. Distributional and environmental records for Ceratium furca Ehrenbergi -- Continued

|                |             |           |                    |                | ,                    | Ceratium furca      | Diff clipe1        | B1C0I        | it nined                             |
|----------------|-------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| Station        | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 46             | 264         | 0         | 00                 | р              | 11/21/28             | 23.3                | 35.3               | 8.16         | 36                                   |
| 47             | -266        | 0         | r                  | n              | 11/23/28             | 23.9                | 36.0               | 8.23         | 17                                   |
| 47             | 267         | 50        | r                  | n              | 11/23/28             | 23.8                | 36.0               | 8.23         | 20                                   |
| 47<br>47       | 268<br>269  | 100       | oc                 | n              | 11/23/28             | 22.7                | 36.2               | 8.23         | 20                                   |
| 47             | 270         | 50        | r                  | p              | 11/23/28<br>11/23/28 | 23.9                | 36.0               | 8.23         | 17                                   |
| 50             | 289         | 100       | r                  | p<br>p         | 11/29/28             | 23.8<br>20.5        | 36.0<br>35.7       | 8.23<br>8.22 | 20                                   |
| 56-57          | 334         | 0         | r                  | n              | 12/19/28             | (19.0               | 34.5               | 8.14         | 13<br>20)                            |
| 57             | 336         | 50        | r                  | n              | 12/20/28             | 15.6                | 34.3               | 8.14         | 21                                   |
| 58             | 341         | 0         | oc                 | n              | 12/22/28             | 17.0                | 34.0               | 8.12         | 20                                   |
| 58<br>58       | 342         | 50        | С                  | n              | 12/22/28             | 14.8                | 34.0               | 8.12         | 25                                   |
| 58             | 344<br>345  | 0<br>50   | oc<br>oc           | p              | 12/22/28             | 17.0                | 34.0               | 8.12         | 20                                   |
| 58             | 346         | 100       | oc                 | p<br>p         | 12/22/28<br>12/22/28 | 14.8<br>12.3        | 34.0<br>34.1       | 8.12<br>8.05 | 25<br>40                             |
| 59             | 347         | 0         | oc                 | n              | 12/24/28             | 16.3                | 34.0               | 8.10         | 38                                   |
| 59             | 348         | 0         | oc                 | n              | 12/24/28             | 16.3                | 34.0               | 8.10         | 38                                   |
| 59             | 349         | 50        | r                  | n              | 12/24/28             | 14.0                | 34.0               | 8.08         | 38                                   |
| 59<br>59       | 350<br>351  | 100<br>0  | c                  | n              | 12/24/28             | 11.4                | 34.1               | 8.03         | 72                                   |
| 59             | 352         | 50        | c<br>r             | p              | 12/24/28<br>12/24/28 | 16.3<br>14.0        | 34.0               | 8.10         | 38                                   |
| 59             | 353         | 100       | r                  | p<br>p         | 12/24/28             | 11.4                | 34.0<br>34.1       | 8.08<br>8.03 | 38<br>72                             |
| 60             | 354         | 0         | oc                 | n              | 12/26/28             | 15.0                | 34.0               | 8.07         | 50                                   |
| 60             | 355         | 50        | oc                 | n              | 12/26/28             | 13.4                | 34.0               | 8.06         | 54                                   |
| 60<br>60       | 356<br>357  | 100       | oc                 | n              | 12/26/28             | 10.6                | 34.0               | 8.03         | 62                                   |
| 60             | 358         | 50        | oc<br>r            | p              | 12/26/28<br>12/26/28 | 15.0<br>13.4        | 34.0               | 8.07         | 50                                   |
| 60             | 359         | 0         | r                  | p<br>p         | 12/26/28             | 15.0                | 34.0<br>34.0       | 8.06<br>8.07 | 54<br>50                             |
| 60-61          | 360         | 0         | С                  | n              | 12/26/28             | (15.0               | 34.0               | 8.07         | 50)                                  |
| 60-61          | 361         | 0         | oc                 | n              | 12/26/28             | (15.0               | 34.0               | 8.07         | 50)                                  |
| 60-61<br>61    | 362<br>363  | 0         | r                  | n              | 12/26/28             | (15.0               | 34.0               | 8.07         | 50)                                  |
| 61             | 364         | 50        | r                  | n<br>n         | 12/28/28<br>12/28/28 | 16.9<br>14.0        | 34.0<br>34.0       | 8.05<br>8.05 | 46                                   |
| 61             | 365         | 100       | r                  | n              | 12/28/28             | 10.8                | 34.0               | 8.03         | 80                                   |
| 61             | 366         | 0         | a                  | p              | 12/28/28             | 16.9                | 34.0               | 8.05         | 46                                   |
| 61<br>61       | 367         | 50        | oc                 |                | 12/28/28             | 14.0                | 34.0               | 8.05         | 60                                   |
| 61-62          | 368<br>369  | 100       | oc<br>c            |                | 12/28/28<br>12/29/28 | 10.8<br>(16.9       | 34.0               | 8.03         | 80                                   |
| 61-62          | 370         | ŏ         | a                  |                | 12/29/28             | (16.9               | 34.0<br>34.0       | 8.05<br>8.05 | 46)<br>46)                           |
| 62             | 372         | 50        | oc                 | n              | 12/30/28             | 16.2                | 34.3               | 8.10         | 28                                   |
| 62             | 373         | 100       | C                  |                | 12/30/28             | 13.1                | 34.2               | 8.06         | 48                                   |
| 62<br>62       | 374<br>375  | 0<br>50   | oc                 |                | 12/30/28             | 19.2                | 34.2               | 8.12         | 32                                   |
| 62             | 376         | 100       | r                  | p<br>p         | 12/30/28 $12/30/28$  | 16.2<br>13.1        | 34.3<br>34.2       | 8.10<br>8.06 | 28<br>48                             |
| 62-63          | 377         | 0         | r                  | n              | 12/31/28             | (20.5               | 34.6               | 8.07         | 21)                                  |
| 63             | 382         | 0         | r                  | p              | 1/ 1/29              | 20.5                | 34.6               | 8.07         | 21                                   |
| 63<br>63-64    | 384<br>386  | 100       | r                  | p              | 1/ 1/29              | 15.6                | 34.6               | 8.08         | 24                                   |
| 63-64          | 387         | 0         | oc<br>r            | n<br>n         | 1/ 1/29<br>1/ 2/29   | (20.5<br>(20.5      | 34.6               | 8.07         | 21)                                  |
| 63-64          | 388         | Õ         | r                  | n              | 1/ 2/29              | (20.5               | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)                           |
| 63-64          | <b>3</b> 89 | 0         | oc                 | n              | 1/ 2/29              | (20.5               | 34.6               | 8.07         | 21)                                  |
| 63-64          | 390         | 0         | r                  | n              | 1/ 2/29              | (20.5               | 34.6               | 8.07         | 21)                                  |
| 63-64<br>63-64 | 391<br>392  | 0         | oc                 | n              | 1/3/29               | (20.5               | 34.6               | 8.07         | 21)                                  |
| 63-64          | 393         | ő         | r                  | n<br>n         | 1/ 3/29<br>1/ 3/29   | (20.5<br>(20.5      | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)                           |
| 64             | 394         | 0         | r                  | n              | 1/ 3/29              | (20.5               | 34.6               | 8.07         | 21)                                  |
| 64             | 395         | 50        | $\mathbf{r}$       | n              | 1/3/29               | 17.2                | 34.6               | 8.12         | 29                                   |
| 64<br>64       | 397<br>398  | 100       | r                  | n              | 1/ 3/29              | 15.8                | 34.5               | 8.10         | 32                                   |
| 64             | 399         | 50        | oc<br>r            | p              | 1/ 3/29<br>1/ 3/29   | 20.6<br>17.2        | 34.6<br>34.6       | 8.12<br>8.12 | 21<br>29                             |
| 64             | 400         | 100       | r                  | p<br>p         | 1/ 3/29              | 15.8                | 34.5               | 8.10         | 32                                   |
| 64-65          | 401         | 0         | oc                 | n              | 1/ 3/29              | (20.6               | 34.6               | 8.12         | 21)                                  |
| 64-65<br>64-65 | 402         | 0         | oc                 | n              | 1/ 4/29              | (20.6               | 34.6               | 8.12         | 21)                                  |
| 64-65          | 403<br>404  | 0         | oc                 | n<br>n         | 1/ 4/29<br>1/ 4/29   | (20.6<br>(20.6      | 34.6<br>34.6       | 8.12         | 21)                                  |
| 65             | 405         | 0         | r                  | n              | 1/ 5/29              | 20.2                | 34.5               | 8.12<br>8.10 | 21)                                  |
| 65             | 406         | 50        | r                  | n              | 1/5/29               | 16.5                | 34.5               | 8.10         | 24<br>25                             |
| 65             | 408         | 0         | oc                 | p              | 1/ 5/29              | 20.2                | 34.5               | 8.10         | 24                                   |
| 65<br>68       | 409<br>422  | 50        | oc                 | p              | 1/5/29               | 16.5                | 34.5               | 8.10         | 25                                   |
| 68             | 422         | 0<br>50   | r                  | p              | 1/10/29<br>1/10/29   | 19.2<br>18.2        | 35.1<br>35.0       | 8.14         | 29                                   |
| 69             | 425         | 50        | r                  | p<br>n         | 1/12/29              | 17.4                | 35.1               | 8.14<br>7.99 | 29<br>151                            |
| 69             | 426         | 100       | r                  | n              | 1/12/29              | 14.6                | 34.8               | 7.86         | 198                                  |
| 69             | 427         | 0         | oc                 | p              | 1/12/29              | 21.1                | 35.2               | 8.12         | 62                                   |
| 70<br>70       | 432<br>433  | 50<br>100 | r                  | n              | 1/13/29<br>1/13/29   | 15.4<br>12.6        | 35.0               | 7.88         | 178                                  |
| 70             | 434         | 0         | r                  | n<br>p         | 1/13/29              | 21.2                | 34.8<br>35.1       | 7.68<br>8.05 | 233<br>103                           |
|                | 101         |           | ^                  | Р              | 2/10/20              | 41.4                | 55.1               | 0.00         | 103                                  |

Table 6. Distributional and environmental records for Ceratium furca Ehrenbergi--Continued

| Station    | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature (°C) | Salinity<br>(o/oo) | рН                           | PO4<br>mg/m3                                    |
|------------|------------|-----------|--------------------|----------------|--------------------|------------------|--------------------|------------------------------|---|
| 71         | 439        | 50        | r                  | n              | 2/ 6/29            | 16.7             | 35.1               | 7.90                         | 150   |
| 71         | 441        | 0         | oc                 | p              | 2/6/29             | 23.5             | 35.2               | 8.13                         | 58  |
| 72         | 444        | 50        | oc ·               | n              | 2/ 8/29            | 18.7             | 35.4               | 8.12                         | 60  |
| 72<br>72   | 445<br>446 | 100       | r                  | n              | 2/ 8/29<br>2/ 8/29 | 14.8<br>24.9     | 35.0<br>35.3       | 7.94<br>8.16                 | 154<br>50                                       |
| 72         | 447        | 50        | r                  | p<br>p         | 2/ 8/29            | 18.7             | 35.4               | 8.12                         | 60  |
| 72-73      | 449        | 0         | oc                 | n              | 2/ 9/29            | (25.3            | 35.4               | 8.21                         | 44)   |
| 73         | 450        | 0         | oc                 | n              | 2/10/29            | 25.3             | 35.4               | 8.21                         | 44  |
| 73         | 451        | 50        | oc                 | n              | 2/10/29            | 18.7             | 35.4               | 8.05                         | 122   |
| 73         | 452<br>453 | 100       | oc                 | n              | 2/10/29            | 14.7<br>25.3     | 35.0<br>35.4       | 7.80<br>8.21                 | 178<br>44                                       |
| 73<br>73   | 454        | 0<br>50   | c<br>r             | p<br>p         | 2/10/29<br>2/10/29 | 18.7             | 35.4               | 8.05                         | 122   |
| 73         | 455        | 100       | r                  | p              | 2/10/29            | 14.7             | 35.0               | 7.80                         | 178   |
| 74         | 456        | 0         | · r                | 'n             | 2/12/29            | 24.2             | 35.6               | 8.17                         | 68  |
| 74         | 457        | 50        | r                  | n              | 2/12/29            | 19.2             | 35.4               | 8.06                         | 80  |
| 74         | 459        | 0         | r                  | p              | 2/12/29            | 24.2             | 35.6               | 8.17                         | 68  |
| 74<br>75   | 460<br>464 | 50<br>100 | r<br>oc            | p<br>n         | 2/12/29<br>2/14/29 | 19.2<br>17.8     | 35.4<br>35.4       | 8.06                         | 80<br>75  |
| 75         | 465        | 0         | r                  | p              | 2/14/29            | 22.8             | 35.8               | 8.18                         | 44  |
| 77         | 473        | ŏ         | r                  | p              | 2/18/29            | 23.7             | 36.0               | 8.19                         | 16  |
| 78         | 476        | 50        | r                  | ñ              | 2/20/29            | 23.8             | 36.1               | 8.14                         | 32  |
| 78         | 477        | 100       | oc                 | n              | 2/20/29            | 21.9             | 36.2               | 8.14                         | 34  |
| 78         | 478        | 0         | r                  | p              | 2/20/29            | 24.6             | 36.0               | 8.17                         | 32  |
| 78<br>79   | 479<br>483 | 50<br>100 | r                  | p<br>n         | 2/20/29<br>2/22/29 | 23.8<br>21.8     | 36.1<br>36.2       | 8.14                         | 32<br>45  |
| 80         | 488        | 0         | r                  | p              | 2/24/29            | 26.0             | 35.9               | 8.20                         | 36  |
| 80         | 490        | 100       | r                  | p              | 2/24/29            | 23.4             | 36.2               | 8.16                         | 32  |
| 81         | 493        | 0         | r                  | р              | 2/26/29            | 26.5             | 35.8               | 8.19                         | 38  |
| 82         | 498        | 0         | r                  | p              | 2/28/29            | 27.2             | 36.3               | 8.21                         | 34  |
| 83         | 504        | 50        | r                  | p              | 3/2/29             | 27.4             | 36.5               | 8.24                         | 25  |
| 89<br>89   | 530<br>532 | 0         | r                  | p<br>n         | 3/23/29<br>3/23/29 | 28.4<br>(28.4    | 35.6<br>35.6       | 8. <b>25</b><br>8. <b>25</b> | 21<br>21)                                       |
| Samoa      | 555        | ŏ         | oc                 | n              | 4/ 2/29            | (20.1            | 00.0               | 0.20                         |   |
| 96         | 568        | 0         | r                  | n              | 4/26/29            | 29.3             | 35.3               | 8.23                         | 12  |
| 95         | 568A       | 0         | r                  | n              | 4/25/29            | (29.4            | 34.7               | 8.26                         | 14)   |
| 96         | 571        | 0         | oc                 | p              | 4/26/29            | 29.3             | 35.3               | 8.23                         | 12  |
| 96<br>97   | 573<br>577 | 100       | oc                 | p              | 4/26/29            | 28.2<br>28.3     | 35.7<br>35.2       | 8.19<br>8.16                 | 25<br>24  |
| 97         | 578        | 50        | oc<br>r            | p              | 4/28/29<br>4/28/29 | 28.0             | 35.4               | 8.16                         | 21  |
| 97         | 579        | 100       | oc                 | p<br>p         | 4/28/29            | 27.6             | 35.6               | 8.15                         | 25  |
| 98         | 584        | 0         | r                  | р              | 4/30/29            | 27.0             | 35.3               | 8.16                         | 24  |
| 99         | 593        | 50        | r                  | p              | 5/ 2/29            | 27.8             | 34.9               | 8.22                         | 12  |
| 100        | 596        | 50        | r                  | n              | 5/4/29             | 27.6             | 34.7               | 8.21                         | 10  |
| 104<br>105 | 624<br>630 | 0         | r                  | p              | 5/13/29<br>5/15/29 | 26.1<br>26.9     | 35.2<br>34.9       | 8.24<br>8.23                 | 5   |
| 108        | 649        | ŏ         | r                  | p              | 5/27/29            | 28.4             | 35.0               | 8.25                         | 4   |
| 110        | 661        | Ŏ         | c                  | p<br>n         | 5/31/29            | 23.9             | 34.7               | 8.18                         | 7<br>5<br>4<br>5<br>7                           |
| 110        | 662        | 50        | c                  | n              | 5/31/29            | 18.4             | 34.8               | 8.16                         | 7   |
| 110        | 663        | 100       | С                  | n              | 5/31/29            | 17.9             | 34.7               | 8.14                         | 11  |
| 110<br>110 | 664<br>665 | 0<br>50   | a                  | p              | 5/31/29<br>5/31/29 | 23.9<br>18.4     | 34.7<br>34.8       | 8.18<br>8.16                 | 5<br>7  |
| 110        | 666        | 100       | oc<br>oc           | p<br>p         | 5/31/29            | 17.9             | 34.7               | 8.14                         | 11  |
| 111        | 668        | 0         | c                  | n              | 6/ 3/29            | 20.1             | 34.5               | 8.18                         | 5   |
| 111        | 669        | 50        | oc ·               | n              | 6/ 3/29            | 19.4             | 34.6               | 8.17                         | 5<br>5<br>5<br>7<br>8<br>7<br>7<br>5<br>5<br>91 |
| 111        | 671        | 0         | oc                 | p              | 6/ 3/29            | 20.1             | 34.5               | 8.18                         | 5   |
| 111<br>112 | 672<br>675 | 50        | r                  | p              | 6/ 3/29<br>6/ 5/29 | 19.4<br>21.7     | 34.6<br>34.6       | 8.17<br>8.23                 | 7   |
| 112        | 676        | 50<br>100 | oc<br>oc           | n<br>n         | 6/ 5/29            | 19.8             | 34.7               | 8.20                         | 8   |
| 112        | 677        | 0         | r                  | p              | 6/ 5/29            | 23.2             | 34.6               | 8.22                         | 7   |
| 112        | 678        | 50        | r                  | p              | 6/5/29             | 21.7             | 34.6               | 8.23                         | 7   |
| 113        | 680        | 0         | r                  | n              | 6/25/29            | 24.2             | 34.5               | 8.25                         | 5   |
| 113        | 683        | 100       | r                  | p              | 6/25/29            | 24.2<br>13.0     | 34.5<br>34.5       | 8.25<br>8.00                 | 01  |
| 114<br>114 | 688<br>689 | 100       | r                  | p<br>p         | 6/27/29<br>6/27/29 | 19.9             | 34.3               | 8.15                         | 7   |
| 114        | 690        | 50        | oc                 | þ              | 6/27/29            | 16.2             | 34.6               | 8.04                         | 63  |
| 115        | 693        | 50        | r                  | n              | 6/29/29            | 17.5             | 34.6               | 8.12                         | 17  |
| 115        | 694        | 100       | r                  | n              | 6/29/29            | 15.6             | 34.6               | 8.08                         | 27  |
| 115        | 695        | 0         | oc                 | p              | 6/29/29            | 20.6             | 34.6               | 8.19                         | 4 4   |
| 115        | 696        | 0         | oc                 | p              | 6/29/29<br>6/29/29 | 20.6<br>17.5     | 34.6<br>34.6       | 8.19<br>8.12                 | 17  |
| 115<br>117 | 697<br>709 | 50<br>50  | r                  | · p<br>n       | 7/3/29             | 12.5             | 34.2               | 8.06                         | 51  |
| 117        | 710        | 100       | r                  | n              | 7/ 3/29            | 8.8              | 34.1               | 7.98                         | 84  |
|            | 711        | 0         | r                  | p              | 7/ 3/29            | 15.9             | 34.3               | 8.17                         | 3   |
| 117        |            |           |                    |                |                    | 400              |                    | 0 40                         |   |
| 129<br>130 | 780<br>784 | 0         | r                  | n<br>p         | 7/27/29 9/ 4/29    | 16.3<br>16.2     | 33.1<br>33.4       | 8.13<br>8.34                 | 25<br>36  |

Table 6. Distributional and environmental records for Ceratium furca Ehrenbergi--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------|
| 131     | 793    | 0         | r                  | р              | 9/6/29   | 19.3                | 33.4               | 8.34 |                          |
| 131     | 794    | 0         | г                  | p              | 9/6/29   | 19.3                | 33.4               | 8.34 |                          |
| 131     | 795    | 0         | r                  | p              | 9/6/29   | 19.3                | 33.4               | 8.34 |                          |
| 132     | 797    | Ŏ         | r                  | 'n             | 9/8/29   | 21.0                | 33.9               | 8.34 | 15                       |
| 132     | 801    | Ö         | oc                 | p              | 9/8/29   | 21.0                | 33.9               | 8.34 | 15                       |
| 132     | 803    | 100       | r                  | p              | 9/ 8/29  | 14.3                | 33.4               | 8.30 | 16                       |
| 136     | 832    | 0         | r                  | p              | 9/16/29  | 24.6                | 35.4               | 8.37 |                          |
| 136     | 833    | 50        | r                  | p              | 9/16/29  | 21.4                | 35.1               | 8.39 | 3                        |
| 140     | 858    | 100       | r                  | n              | 10/3/29  | 25.5                | 35.0               | 8.34 | 7                        |
| 141     | 869    | 50        | r                  | p              | 10/ 5/29 | 24.8                | 35.3               | 8.34 | 5                        |
| 142     | 872    | 0         | r                  | n              | 10/ 7/29 | 24.1                | 34.8               | 8.33 | 5                        |
| 142     | 877    | 50        | r                  | p              | 10/ 7/29 | 21.8                | 34.8               | 8.30 | 5                        |
| 142     | 879    | 100       | r                  | p              | 10/ 7/29 | 16.6                | 34.4               | 8.27 | 7                        |
| 144     | 889    | 100       | r                  | p              | 10/11/29 |                     | 34.5               | 8.37 | 6                        |
| 146     | 897    | 50        | r                  | n              | 10/15/29 | 22.4                | 34.9               | 8.30 | 6                        |
| 146     | 900    | 0         | r                  | p              | 10/15/29 | 22.4                | 34.9               | 8.37 | 6                        |
| 147     | 907    | ő         | r                  |                | 10/17/29 | 23.3                | 35.3               | 8.26 | 8                        |
| 153     | 955    | ő         | oc                 | p              | 10/29/29 | 28.1                | 34.2               | 8.47 | 8                        |
| 158     | 983    | 0         | r                  | p<br>n         | 11/ 8/29 | 28.2                | 35.6               | 8.34 | 36                       |
| 158     | 985    | 100       | r                  | n              | 11/ 8/29 | 27.6                | 35.9               | 8.39 | 48                       |

Table 7. Distributional and environmental records for Ceratium belone

| Station         Sample         Depth (m)         Relative abundance         Apparatus         Date         Temperature (°C)         Salinity (o/oo)         pH         PO4 mg/m           1b         8         100         r         n         5/16/28         20.3         36.5         8.18         36           18         114         0         r         p         8/17/28         27.0         37.0         8.23         5           47         268         100         r         n         11/23/28         23.8         36.0         8.23         20           49         277         0         oc         n         11/27/28         23.4         36.2         8.27         13           49         278         50         r         n         11/27/28         23.4         36.2         8.27         13           49         278         50         r         n         11/27/28         22.6         36.1         8.26         13           49         280         0         r         p         11/27/28         23.4         36.2         8.27         13           49a         283         0         oc         n         11/28/28 <td< th=""></td<> |
|---|
| 1b  |
| 1b         8         100         r         n         5/16/28         20.3         36.5         8.18         36           18         114         0         r         p         8/17/28         27.0         37.0         8.23         5           47         267         50         r         n         11/23/28         23.8         36.0         8.23         20           47         268         100         r         n         11/23/28         22.7         36.2         8.23         20           49         277         0         oc         n         11/27/28         23.4         36.2         8.27         13           49         278         50         r         n         11/27/28         22.6         36.1         8.26         13           49         279         100         oc         n         11/27/28         21.6         35.9         8.26         13           49         280         0         r         p         11/27/28         23.4         36.2         8.27         13           49a         283         0         oc         n         11/28/28         (23.2         36.0         8.23  |
| 18       114       0       r       p       8/17/28       27.0       37.0       8.23       5         47       267       50       r       n       11/23/28       23.8       36.0       8.23       20         47       268       100       r       n       11/23/28       22.7       36.2       8.23       20         49       277       0       oc       n       11/27/28       23.4       36.2       8.27       13         49       279       100       oc       n       11/27/28       21.6       35.9       8.26       13         49       280       0       r       p       11/27/28       23.4       36.2       8.27       13         49a       283       0       oc       n       11/27/28       23.4       36.2       8.27       13         49a       283       0       oc       n       11/30/28       (22.8       35.6       8.22       16         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16         50-51       291       0       oc       n       11/30/28       (22.  |
| 47         267         50         r         n         11/23/28         23.8         36.0         8.23         20           47         268         100         r         n         11/23/28         22.7         36.2         8.23         20           49         277         0         oc         n         11/27/28         23.4         36.2         8.27         13           49         278         50         r         n         11/27/28         22.6         36.1         8.26         13           49         279         100         oc         n         11/27/28         21.6         35.9         8.26         13           49         280         0         r         p         11/27/28         23.4         36.2         8.27         13           49a         283         0         oc         n         11/28/28         (23.2         36.0         8.23         13)           50-51         290         0         r         n         11/30/28         (22.8         35.6         8.22         16)           50-51         291         0         oc         n         11/30/28         (22.8         35.6         8                             |
| 47       267       50       r       n       11/23/28       23.8       36.0       8.23       20         47       268       100       r       n       11/23/28       22.7       36.2       8.23       20         49       277       0       oc       n       11/27/28       23.4       36.2       8.27       13         49       278       50       r       n       11/27/28       22.6       36.1       8.26       13         49       279       100       oc       n       11/27/28       21.6       35.9       8.26       13         49       280       0       r       p       11/27/28       23.4       36.2       8.27       13         49a       283       0       oc       n       11/28/28       (23.2       36.0       8.23       13)         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16)         50-51       291       0       oc       n       11/30/28       (22.8       35.6       8.22       16)         50-51       292       0       r       n       12/1/28       <  |
| 49       277       0       oc       n       11/27/28       23.4       36.2       8.27       13         49       278       50       r       n       11/27/28       22.6       36.1       8.26       13         49       279       100       oc       n       11/27/28       21.6       35.9       8.26       13         49       280       0       r       p       11/27/28       23.4       36.2       8.27       13         49a       283       0       oc       n       11/28/28       (23.2       36.0       8.23       13)         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16)         50-51       291       0       oc       n       11/30/28       (22.8       35.6       8.22       16)         50-51       292       0       r       n       11/30/28       (22.8       35.6       8.22       16)         51       293       0       r       n       12/1/28       20.5       35.6       8.22       17         51       294       50       oc       n       12/1/28       <  |
| 49         278         50         r         n         11/27/28         22.6         36.1         8.26         13           49         279         100         oc         n         11/27/28         21.6         35.9         8.26         13           49         280         0         r         p         11/27/28         23.4         36.2         8.27         13           49a         283         0         oc         n         11/28/28         (23.2         36.0         8.23         13)           50-51         290         0         r         n         11/30/28         (22.8         35.6         8.22         16)           50-51         291         0         oc         n         11/30/28         (22.8         35.6         8.22         16)           50-51         292         0         r         n         12/1/28         22.8         35.6         8.22         16)           51         293         0         r         n         12/1/28         22.8         35.6         8.22         16           51         294         50         oc         n         12/1/28         20.5         35.6         8                             |
| 49       278       50       r       n       11/27/28       22.6       36.1       8.26       13         49       279       100       oc       n       11/27/28       21.6       35.9       8.26       13         49       280       0       r       p       11/27/28       23.4       36.2       8.27       13         49a       283       0       oc       n       11/28/28       (23.2       36.0       8.23       13)         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16)         50-51       291       0       oc       n       11/30/28       (22.8       35.6       8.22       16)         50-51       292       0       r       n       11/30/28       (22.8       35.6       8.22       16)         51       293       0       r       n       12/1/28       22.8       35.6       8.22       16         51       294       50       oc       n       12/1/28       20.5       35.6       8.22       17         51       295       100       oc       n       12/1/28   |
| 49       279       100       oc       n       11/27/28       21.6       35.9       8.26       13         49       280       0       r       p       11/27/28       23.4       36.2       8.27       13         49a       283       0       oc       n       11/28/28       (23.2       36.0       8.23       13)         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16)         50-51       291       0       oc       n       11/30/28       (22.8       35.6       8.22       16)         51-51       292       0       r       n       11/30/28       (22.8       35.6       8.22       16)         51       293       0       r       n       12/1/28       22.8       35.6       8.22       16)         51       293       0       r       n       12/1/28       20.5       35.6       8.22       16)         51       293       0       r       n       12/1/28       20.5       35.6       8.22       17         51       295       100       oc       n       12/1/28 <t< th=""></t<>   |
| 49a       283       0       oc       n       11/28/28       (23.2       36.0       8.23       13)         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16)         50-51       291       0       oc       n       11/30/28       (22.8       35.6       8.22       16)         51       293       0       r       n       12/1/28       22.8       35.6       8.22       16)         51       294       50       oc       n       12/1/28       20.5       35.6       8.22       17         51       295       100       oc       n       12/1/28       20.5       35.6       8.22       17         51       295       100       oc       n       12/1/28       20.0       35.6       8.22       17         51       295       100       oc       n       12/10/28       (23.0       35.6       8.22       17         53-54       311       0       r       n       12/10/28       (23.0       35.6       8.22       11)         53-54       313       0       r       n       12/10/28   |
| 49a       283       0       oc       n       11/28/28       (23.2       36.0       8.23       13)         50-51       290       0       r       n       11/30/28       (22.8       35.6       8.22       16)         50-51       292       0       r       n       11/30/28       (22.8       35.6       8.22       16)         51       293       0       r       n       12/1/28       22.8       35.6       8.22       16)         51       294       50       oc       n       12/1/28       20.5       35.6       8.22       16         51       295       100       oc       n       12/1/28       20.5       35.6       8.22       17         51       295       100       oc       n       12/1/28       20.0       35.6       8.22       17         53-54       310       0       r       n       12/10/28       (23.0       35.6       8.22       11)         53-54       311       0       r       n       12/10/28       (23.0       35.6       8.22       11)         53-54       313       0       r       n       12/10/28   |
| 50-51     291     0     oc     n     11/30/28     (22.8     35.6     8.22     16)       50-51     292     0     r     n     11/30/28     (22.8     35.6     8.22     16)       51     293     0     r     n     12/1/28     22.8     35.6     8.22     16       51     294     50     oc     n     12/1/28     20.5     35.6     8.22     17       51     295     100     oc     n     12/1/28     20.0     35.6     8.22     17       53-54     310     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     311     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16  |
| 50-51         291         0         oc         n         11/30/28         (22.8         35.6         8.22         16)           50-51         292         0         r         n         11/30/28         (22.8         35.6         8.22         16)           51         293         0         r         n         12/1/28         22.8         35.6         8.22         16           51         294         50         oc         n         12/1/28         20.5         35.6         8.22         17           51         295         100         oc         n         12/1/28         20.0         35.6         8.22         17           53-54         310         0         r         n         12/10/28         (23.0         35.6         8.22         11)           53-54         311         0         r         n         12/10/28         (23.0         35.6         8.22         11)           53-54         313         0         r         n         12/10/28         (23.0         35.6         8.22         11)           54         320         50         r         n         12/14/28         19.8         35.4                                |
| 50-51         292         0         r         n         11/30/28         (22.8         35.6         8.22         16)           51         293         0         r         n         12/1/28         22.8         35.6         8.22         16           51         294         50         oc         n         12/1/28         20.5         35.6         8.22         17           51         295         100         oc         n         12/1/28         20.0         35.6         8.22         17           53-54         310         0         r         n         12/10/28         (23.0         35.6         8.22         11)           53-54         311         0         r         n         12/10/28         (23.0         35.6         8.22         11)           53-54         313         0         r         n         12/10/28         (23.0         35.6         8.22         11)           54         320         50         r         n         12/14/28         19.8         35.4         8.18         17           54         321         100         r         n         12/14/28         18.7         35.4 <t< th=""></t<>                    |
| 51     293     0     r     n     12/1/28     22.8     35.6     8.22     16       51     294     50     oc     n     12/1/28     20.5     35.6     8.22     17       51     295     100     oc     n     12/1/28     20.0     35.6     8.22     17       53-54     310     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     311     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12  |
| 51     294     50     oc     n     12/1/28     20.5     35.6     8.22     17       51     295     100     oc     n     12/1/28     20.0     35.6     8.22     17       53-54     310     o     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     311     o     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     o     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     o     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12   |
| 51     295     100     oc     n     12/1/28     20.0     35.6     8.22     17       53-54     310     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     311     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12  |
| 53-54     310     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     311     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12  |
| 53-54     311     0     r     n     12/10/28     (23.0     35.6     8.22     11)       53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12   |
| 53-54     313     0     r     n     12/10/28     (23.0     35.6     8.22     11)       54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12  |
| 54     320     50     r     n     12/14/28     19.8     35.4     8.18     17       54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12   |
| 54     321     100     r     n     12/14/28     18.7     35.4     8.16     20       55     323     0     r     n     12/16/28     20.4     34.9     8.19     12       55     324     50     r     n     12/16/28     18.7     35.0     8.18     12  |
| 55 323 0 r n 12/16/28 20.4 34.9 8.19 12<br>55 324 50 r n 12/16/28 18.7 35.0 8.18 12   |
| 55 324 50 r n 12/16/28 18.7 35.0 8.18 12  |
|   |
|   |
| 74 456 0 r n 2/12/29 24.2 35.6 8.17 68  |
| 79 481 0 r n 2/22/29 25.2 36.0 8.17 34  |
| 79 482 50 r n 2/22/29 24.5 36.1 8.17 34   |
| 79 483 100 r n 2/22/29 21.8 36.2 8.13 45  |
| 80 488 0 oc p 2/24/29 26.0 35.9 8.20 36   |
| 81 493 0 r p 2/26/29 26.5 35.8 8.19 38  |
| 82 496 0 r n 2/28/29 27.2 36.3 8.21 34  |
| 91 540 0 r n 3/27/29 28.7 35.1 8.30 21  |
| 91 541 50 r n 3/27/29 28.5 35.2 8.30 24   |
| 94 558 50 r n 4/22/29 29.3 34.7 8.25 14   |
| 95 563 50 r n 4/24/29 29.3 34.9 8.24 16   |
| 96 569 50 r n 4/26/29 29.2 35.3 8.23 25   |
| 96 570 100 r n 4/26/29 28.2 35.7 8.19 25  |
| 96 571 0 r p 4/26/29 29.3 35.3 8.23 12  |
| 97 574 0 r n 4/28/29 28.3 35.2 8.16 24  |
| 97 576 100 r n 4/28/29 27.6 35.6 8.15 25  |
| 97 577 0 r p 4/28/29 28.3 35.2 8.16 24  |
| 97 579 100 r p 4/28/29 27.6 35.6 8.15 25  |
| 100 598 0 r p 5/4/29 27.7 34.7 8.21 10  |
| 133 804 0 r n 9/10/29 22.7 34.7 8.47 7  |
| 142 874 100 r n 10/7/29 16.6 34.4 8.27 7  |
| 145 890 0 r n 10/13/29 22.3 34.6 8.29 6   |
| 145 893 0 r p 10/13/29 22.3 34.6 8.29 6   |
| 145 895 100 r p 10/13/29 16.0 34.1 3.31 6   |
| 110 000 100 1 p 10/10/20 10/10 01/1 0/02  |

Table 7. Distributional and environmental records for Ceratium belone--Concluded

| Station | Sample | Depth<br>(m) | Relative<br>abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|--------------|-----------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 158     | 983    | 0            | r                     | n              | 11/ 8/29 | 28.2                | 35.6               | 8.34 | 36                                   |
| 158     | 985    | 100          |                       | n              | 11/ 8/29 | 27.6                | 35.9               | 8.39 | 48                                   |
| 159     | 990    | 0            | r                     | n              | 11/11/29 | 28.6                | 35.7               | 8.37 | 15                                   |
| 159     | 991    | 50           |                       | n              | 11/11/29 | 28.5                | 35.7               | 8.39 | 15                                   |

Table 8. Distributional and environmental records for Ceratium incisum

| Station    | Sample     | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m <sup>3</sup> |
|------------|------------|--------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------------|
| 16         | 103        | 0            | r                  | p              | 8/13/28            | <b>25.</b> 9        | 36.2               | 8.24         | 8                        |
| 33         | 198        | 50           | r                  | n              | 10/ 8/28           | 28.2                | 36.2               | 8.24         | 4                        |
| 33         | 198A       | 50           | r                  | p              | 10/ 8/28           | 28.2                | 36.2               | 8.24         | 4                        |
| 40         | 232        | 0            | r                  | p              | 11/ 8/28           | 22.2                | 33.7               | 8.21         | 24                       |
| 46         | 261        | Ō            | r                  | 'n             | 11/21/28           | 23.3                | 35.3               | 8.16         | 36                       |
| 46         | 264        | 0            | r                  | р              | 11/21/28           | 23.3                | 35.3               | 8.16         | 36                       |
| 78         | 477        | 100          | r                  | n              | 2/20/29            | 21.9                | 36.2               | 8.14         | 34                       |
| 79         | 483        | 100          | r                  | n              | 2/22/29            | 21.8                | 36.2               | 8.13         | 45                       |
| 80         | 488        | 0            | r                  | р              | 2/24/29            | 26.0                | 35.9               | 8.20         | 36                       |
| 81         | 493        | 0            | r                  | p              | 2/26/29            | 26.5                | 35.8               | 8.19         | 38                       |
| 82         | 497        | 50           | Г                  | n              | 2/28/29            | 27.2                | 36.3               | 8.21         | 34                       |
| 94         | 559        | 100          | r                  | n              | 4/22/29            | 28.5                | 35.6               | 8.21         | 25                       |
| 95         | 563        | 50           | r                  | n              | 4/24/29            | 29.3                | 34.9               | 8.24         | 16                       |
| 96         | 570        | 100          | r                  | n              | 4/26/29            | 28.2                | 35.7               | 8.19         | 25                       |
| 97         | 574        | 0            | r                  | n              | 4/28/29            | 28.3                | 35.2               | 8.16         | 24                       |
| 98         | 588        | 0-100        | r                  | р              | 4/30/29            | 26.7                | 35.4               | 8.14         | 32                       |
| 99         | 591        | 100          | r                  | n              | 5/ 2/29            | 27.8                | 35.0               | 8.22<br>8.22 | 17                       |
| 100        | 597        | 100<br>100   | r                  | n              | 5/ 4/29<br>5/ 4/29 | 27.6<br>27.6        | 34.7<br>34.7       | 8.22         | 12<br>12                 |
| 100<br>101 | 602<br>605 | 100          | r                  | p              | 5/ 7/29            | 25.2                | 35.1               | 8.23         | 14                       |
| 103        | 615        | 0            | r                  | n<br>n         | 5/11/29            | 26.0                | 35.0               | 8.25         | 8<br>5<br>5<br>5         |
| 105        | 628        | 50           | r                  | n              | 5/15/29            | 26.8                | 34.9               | 8.23         | 5                        |
| 106        | 634        | 50           | r                  | n              | 5/17/29            | 27.0                | 35.0               | 8.23         | 5                        |
| 108        | 648        | 100          | r                  | n              | 5/27/29            | 25.2                | 35.0               | 8.23         | 4                        |
| 139        | 850        | 50           | r                  | n              | 9/22/29            | 25.8                | 34.9               | 8.31         | 6                        |
| 141        | 864        | 0            | r                  | n              | 10/ 5/29           | 25.9                | 35.2               | 8.34         | 6<br>5                   |
| 152        | 945        | 50           | r                  | n              | 10/27/29           | 14.2                | 34.5               | 7.87         | 53                       |
| 155        | 965        | 0            | r                  | n              | 11/ 2/29           | 27.8                | 34.9               | 8.29         | 29                       |
| 156        | 973        | 50           | r                  | n              | 11/ 4/29           | 27.0                | 35.1               | 8.37         | 46                       |
| 158        | 985        | 100          | r                  | n              | 11/ 8/29           | 27.6                | 35.9               | 8.39         | 48                       |
|            |            |              |                    |                |                    |                     |                    |              |                          |

Table 9. Distributional and environmental records for Ceratium pentagonum

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|--------------------|---------------------|--------------------|------|--------------------------------------|
|         |        |           |                    | C>             |                    |                     |                    |      |                                      |
| 13a     | 88     | 0         |                    |                | cies tene          | (21.2               | 35.2               | 8.18 | 44)                                  |
| 13a     | 89     | ő         | c                  | n<br>n         | 8/ 8/28<br>8/ 8/28 | (21.2               | 35.2               | 8.18 | 11)<br>11)                           |
| 14      | 90     | ő         | r                  | n              | 8/ 9/28            | 21.2                | 35.2               | 8.18 | 11                                   |
| 14      | 92     | 50        | r                  |                | 8/ 9/28            | 15.0                | 35.1               | 8.18 | 16                                   |
| 14      | 93     | 0         | oc oc              | p              | 8/ 9/28            | 21.2                | 35.2               | 8.18 | 11                                   |
| 15      | 97     | ŏ         | r                  | p<br>p         | 8/11/28            | 24.8                | 36.4               | 8.21 | 11                                   |
| 15      | 98     | 50        | r                  | p.             | 8/11/28            | 19.8                | 36.5               | 8.21 | 8                                    |
| 15      | 99     | 100       | r                  | p              | 8/11/28            | 18.9                | 36.4               | 8.20 | 19                                   |
| 16      | 103    | 0         | r                  | p              | 8/13/28            | 25.9                | 36.2               | 8.24 | 8                                    |
| 16      | 108    | 100       | r                  | n              | 8/13/28            | 19.9                | 36.5               | 8.17 | 13                                   |
| 17      | 109    | 50        | oc                 | p              | 8/15/28            | 21.9                | 36.6               | 8.28 | 12                                   |
| 17      | 110    | 50        | oc                 | p              | 8/15/28            | 21.9                | 36.6               | 8.28 | 12                                   |
| 17      | 111    | 0         | oc                 | n              | 8/15/28            | 26.2                | 36.6               | 8.29 | 9                                    |
| 18      | 114    | ŏ         | r                  | p              | 8/17/28            | 27.0                | 37.0               | 8.23 | 5                                    |
| 18      | 115    | 50        | oc                 | p              | 8/17/28            | 22.4                | 36.8               | 8.24 | 5                                    |
| 18      | 118    | 50        | r                  | n              | 8/17/28            | 22.4                | 36.8               | 8.24 | 9<br>5<br>5<br>5                     |
| 19      | 121    | 50        | r                  | p              | 8/20/28            | 25.2                | 37.1               | 8.27 | 5                                    |
| 20      | 125    | 0         | r                  | p              | 8/22/28            | 26.0                | 36.6               | 8.37 | 5                                    |
| 20      | 126    | 50        | r                  | p              | 8/22/28            | 25.8                | 36.6               | 8.26 | 3                                    |
| 20      | 127    | 100       | r                  | p              | 8/22/28            | 22.6                | 36.7               | 8.19 | 5<br>3<br>5<br>5                     |
| 20      | 128    | 0         | r                  | n              | 8/22/28            | 26.0                | 36.6               | 8.37 | 5                                    |

Table 9. Distributional and environmental records for Ceratium pentagonum -- Continued

|                | ubic o. Di         | DEL LOUID | ina. ana chivin | Jenna Cillett | 10001001             | or ceratium pe |              | Contra       |                                      |
|----------------|--------------------|-----------|-----------------|---------------|----------------------|----------------|--------------|--------------|--------------------------------------|
| Station        | Sample             | Depth     | Relative        | Appa-         | Date                 | Temperature    | Salinity     | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|                | <u> </u>           | (m)       | abundance       | ratus         | l                    | (°C)           | (0/00)       | 1 -          | mg/m <sup>3</sup>                    |
|                |                    |           | Subs            | pecies te     | enerumC              |                |              |              |                                      |
| 20             | 130                | 100       | oc              | n             | 8/22/28              | 22.6           | 36.7         | 8.19         | . 5                                  |
| 21<br>21       | 134<br>136         | 100<br>50 | r               | p<br>n        | 8/24/28<br>8/24/28   | 21.0<br>24.4   | 36.8<br>36.2 | 8.20<br>8.26 | · 7                                  |
| 22             | 141                | 100       | r               | p             | 8/27/28              | 17.5           | 36.1         | 7.99         | 123                                  |
| 23             | 145                | 0         | r               | p             | 8/29/28              | 27.2           | 35.9         | 8.25         | 4                                    |
| 24<br>25       | 155<br>157         | 50<br>0   | r               | n<br>p        | 8/31/28<br>9/ 3/28   | 23.1<br>27.5   | 36.0<br>35.6 | 8.14<br>8.31 | 8<br><b>5</b>                        |
| <b>2</b> 6     | 164                | 50        | r               | p             | 9/ 5/28              | 24.1           | 36.1         | 8.21         | 5                                    |
| 30             | 189                | 50        | r               | n             | 9/15/28              | 27.8           | 36.1         | 8.29         | 5                                    |
| 30<br>37       | 190<br><b>22</b> 1 | 100<br>50 | r               | n             | 9/15/28<br>11/ 1/28  | 24.1<br>18.8   | 36.4<br>34.5 | 8.10<br>8.00 | 20<br>121                            |
| 40             | 231                | 100       | r               | p<br>n        | 11/ 8/28             | 13.9           | 35.0         | 7.85         | 159                                  |
| 40             | 232                | 0         | oc              | p             | 11/ 8/28             | 22.2           | 33.7         | 8.21         | 24                                   |
| 40<br>41       | 234<br>235         | 100<br>0  | r               | p<br>n        | 11/ 8/28<br>11/10/28 | 13.9<br>20.4   | 35.0<br>34.2 | 7.85<br>8.11 | 159<br>32                            |
| 41             | 236                | 50        | oc              | n             | 11/10/28             | 14.6           | 35.0         | 7.94         | 58                                   |
| 41             | 238                | 0         | r               | р             | 11/10/28             | 20.4           | 34.2         | 8.11         | 32                                   |
| 41<br>42       | 239<br>241         | 100<br>0  | r               | p<br>n        | 11/10/28<br>11/13/28 | 14.5<br>18.7   | 35.0<br>34.7 | 7.91<br>8.06 | 152<br>45                            |
| 42             | 242                | 50        | r               | n             | 11/13/28             | 17.2           | 34.9         | 7.99         | 68                                   |
| 43             | 245                | 50        | r               | n             | 11/15/28             | 17.0           | 34.9         | 7.93         | 80                                   |
| 43<br>43       | 246<br>247         | 100       | r               | n             | 11/15/28<br>11/15/28 | 13.6<br>19.6   | 35.0<br>34.8 | 7.90<br>8.09 | 92<br>52                             |
| 43             | 248                | 50        | r               | p<br>p        | 11/15/28             | 17.0           | 34.9         | 7.93         | 80                                   |
| 43             | 249                | 100       | r               | p             | 11/15/28             | 13.6           | 35.0         | 7.90         | 92                                   |
| 44             | 252<br>253         | 100       | r               | n             | 11/17/28<br>11/17/28 | 13.8<br>20.7   | 35.0<br>34.9 | 7.85<br>8.03 | 70<br>38                             |
| 44<br>44       | 254                | 50        | oc<br>oc        | p<br>p        | 11/17/28             | 20.4           | 34.9         | 8.04         | 34                                   |
| 44             | 255                | 100       | r               | р             | 11/17/28             | 13.8           | 35.0         | 7.85         | 70                                   |
| 45             | 256<br>257         | 0<br>50   | r               | n             | 11/19/28<br>11/19/28 | 22.4<br>22.4   | 35.3<br>35.2 | 8.12<br>8.13 | 38<br>46                             |
| 45<br>45       | 258                | 100       | oc<br>r         | n<br>n        | 11/19/28             | 18.6           | 35.1         | 8.00         | 50                                   |
| 45             | 259                | 0         | oc              | p             | 11/19/28             | 22.4           | 35.3         | 8.12         | 38                                   |
| 45<br>46       | 260<br>264         | 50<br>0   | oc              | p             | 11/19/28<br>11/21/28 | 22.4<br>23.3   | 35.2<br>35.3 | 8.13<br>8.16 | 46<br>36                             |
| 46             | 265                | 50        | r               | p<br>p        | 11/21/28             | 23.2           | 35.3         | 8.16         | 40                                   |
| 47             | 269                | 0         | r               | p             | 11/23/28             | 23.9           | 36.0         | 8.16         | 17                                   |
| 47<br>48       | 270<br>274         | 50<br>0   | r               | p<br>p        | 11/23/28<br>11/23/28 | 23.8<br>23.6   | 36.0<br>36.4 | 8.16<br>8.23 | 20<br>13                             |
| 49             | 280                | ŏ         | r               | p             | 11/27/28             | 23.4           | 36.2         | 8.27         | 13                                   |
| 49             | 281                | 50        | r               | p             | 11/27/28             | 22.6           | 36.1         | 8.26         | 13                                   |
| 50<br>50       | 286<br>287         | 100       | r               | n<br>p        | 11/29/28<br>11/29/28 | 20.5<br>23.2   | 35.7<br>36.0 | 8.22<br>8.23 | 13<br>13                             |
| 50             | 288                | 50        | r               | p             | 11/29/28             | 22.0           | 35.9         | 8.23         | 13                                   |
| 50             | 289                | 100       | r               | p             | 11/29/28             | 20.5           | 35.7         | 8.22         | 13<br>9                              |
| 54<br>59       | 322<br>348         | 0         | r               | p<br>n        | 11/29/28<br>12/24/28 | 23.4<br>16.3   | 35.5<br>34.0 | 8.22<br>8.10 | 38                                   |
| 60             | 359                | ŏ         | r               | , p           | 12/26/28             | 15.0           | 34.0         | 8.07         | 50                                   |
| 62             | 371                | 0         | r               | n             | 12/30/28             | 19.2           | 34.2         | 8.12         | 32<br>28                             |
| 62<br>62       | 372<br>373         | 50<br>100 | r<br>oc         | n<br>n        | 12/30/28<br>12/30/28 | 16.2<br>13.1   | 34.3<br>34.2 | 8.10<br>8.06 | 48                                   |
| 62             | 376                | 100       | $\mathbf{r}$    | p             | 12/30/28             | 13.1           | 34.2         | 8.06         | 48                                   |
| 63             | 377                | 0         | r               | n             | 12/31/28             | (20.5<br>17.0  | 34.6<br>34.6 | 8.07<br>8.08 | 21)<br>25                            |
| 63<br>63       | 380<br>381         | 50<br>100 | r               | n<br>n        | 1/ 1/29<br>1/ 1/29   | 15.6           | 34.6         | 8.08         | . 24                                 |
| 63             | 383                | 50        | Г               | p             | 1/ 1/29              | 11.0           | 34.6         | 8.08         | 25                                   |
| 63-64          | 385                | 0         | r               | n             | 1/ 1/29<br>1/ 1/29   | (20.5<br>(20.5 | 34.6<br>34.6 | 8.07<br>8.07 | 21)<br>21)                           |
| 63-64<br>63-64 | 386<br>387         | 0         | oc<br>r         | n<br>n        | 1/ 2/29              | (20.5          | 34.6         | 8.07         | 21)                                  |
| 63-64          | 389                | 0         | r               | n             | 1/ 2/29              | (20.5          | 34.6         | 8.07         | 21)                                  |
| 63-64<br>63-64 | 390<br>391         | 0         | r               | n             | 1/ 2/29<br>1/ 3/29   | (20.5<br>(20.5 | 34.6<br>34.6 | 8.07<br>8.07 | 21)<br>21)                           |
| 63-64          | 392                | 0         | oc<br>oc        | n<br>n        | 1/ 3/29              | (20.5          | 34.6         | 8.07         | 21)                                  |
| 64             | 397                | 100       | $\mathbf{r}$    | n             | 1/ 3/29              | 15.8           | 34.5         | 8.10         | 32                                   |
| 64<br>64       | 398<br>400         | 0<br>100  | r               | p             | 1/ 3/29<br>1/ 3/29   | 20.6<br>15.8   | 34.6<br>34.5 | 8.12<br>8.10 | 21<br>32                             |
| 64-65          | 400                | 0         | r               | p<br>n        | 1/ 3/29              | (20.6          | 34.6         | 8.12         | 21)                                  |
| 64-65          | 402                | 0         | r               | n             | 1/4/29               | (20.6          | 34.6         | 8.12         | 21)                                  |
| 65<br>66       | 409<br>411         | 50<br>0   | r               | p<br>n        | 1/ 5/29<br>1/ 7/29   | 16.5<br>19.4   | 34.5<br>34.7 | 8.10<br>8.10 | 25<br>29                             |
| 66             | 412                | 100       | r               | n             | 1/ 7/29              | 17.8           | 34.9         | 8.12         | 21                                   |
| 66             | 413                | . 0       | oc              | p             | 1/7/29               | 19.4           | 34.7         | 8.10         | 29<br>29                             |
| 66<br>67       | 414<br>416         | 50<br>0   | r               | p<br>n        | 1/ 7/29<br>1/ 8/29   | 17.8<br>19.3   | 34.8<br>34.9 | 8.10<br>8.11 | 21                                   |
| 01             | 410                |           |                 | **            | -, -, -,             |                |              |              |                                      |

Table 9. Distributional and environmental records for Ceratium pentagonum--Continued

| Station           | Sample     | Depth (m) | Relative abundance | Appa-    | Date               | Temperature (°C) | Salinity<br>(0/00) | pН           | PO4<br>mg/m <sup>3</sup>   |
|-------------------|------------|-----------|--------------------|----------|--------------------|------------------|--------------------|--------------|----------------------------|
|                   |            |           |                    | 1        | 1                  |                  | 1 1 1              |              |                            |
| 67                | 410        | 100       |                    |          | erum Co            | ontinued<br>16.2 | 24 6               | 0.05         | 40                         |
| 68                | 418<br>422 | 0         | r                  | n<br>p   | 1/10/29            | 19.2             | 34.6<br>35.1       | 8.05<br>8.14 | 40<br>29                   |
| 68                | 423        | 50        | r                  | p        | 1/10/29            | 18.2             | 35.0               | 8.14         | 29                         |
| 69                | 425        | 50        | r                  | 'n       | 1/12/29            | 17.4             | 35.1               | 7.99         | 151                        |
| 69                | 426        | 100       | r                  | n        | 1/12/29            | 14.6             | 34.8               | 7.86         | 198                        |
| 69                | 427        | 0         | oc                 | p        | 1/12/29            | 21.1             | 35.2               | 8.12         | 62                         |
| 69<br>70          | 428<br>432 | 50<br>50  | r                  | p<br>n   | 1/12/29<br>1/13/29 | 17.4<br>15.4     | 35.1<br>35.0       | 7.99<br>7.88 | 151<br>178                 |
| 70                | 434        | 0         | r                  | p        | 1/13/29            | 21.2             | 35.1               | 8.05         | 103                        |
| 70                | 436        | 100       | r                  | p        | 1/13/29            | 12.6             | 34.8               | 7.68         | 233                        |
| 71                | 441        | 0         | oc                 | p        | 2/ 6/29            | 23.5             | 35.2               | 8.13         | 58                         |
| 72                | 444        | 50        | r                  | n        | 2/ 8/29            | 18.7             | 35.4               | 8.12         | 60                         |
| 72<br>72          | 446<br>447 | 0<br>50   | r                  | p        | 2/ 8/29<br>2/ 8/29 | 24.9<br>18.7     | 35.3<br>35.4       | 8.16<br>8.12 | 50<br>60                   |
| 72                | 448        | 100       | oc<br>r            | p<br>p   | 2/ 8/29            | 14.8             | 35.4               | 7.94         | 154                        |
| 73                | 450        | 0         | r                  | n        | 2/10/29            | 25.3             | 35.4               | 8.21         | 44                         |
| 73                | 451        | 50        | oc                 | n        | 2/10/29            | 18.7             | 35.4               | 8.05         | 122                        |
| 73                | 452        | 100       | ос                 | n        | 2/10/29            | 14.7             | 35.0               | 7.80         | 178                        |
| 73                | 453        | 0         | oc                 | p        | 2/10/29            | 25.3             | 35.4               | 8.21         | 44                         |
| 73<br>74          | 454<br>459 | 50<br>0   | r                  | p<br>p   | 2/10/29<br>2/12/29 | 18.7<br>24.2     | 35.4<br>35.6       | 8.05<br>8.17 | 12 <b>2</b><br>68          |
| 79                | 481        | ŏ         | r                  | n        | 2/22/29            | 25.2             | 36.0               | 8.17         | 68                         |
| 79                | 482        | 50        | r                  | n        | 2/22/29            | 24.5             | 36.1               | 8.17         | 68                         |
| 79                | 485        | 50        | oc                 | p        | 2/22/29            | 24.5             | 36.1               | 8.17         | 68                         |
| 87                | 522        | 50        | r                  | n        | 3/11/29            | 26.5             | 36.1               | 8.26         | 20                         |
| 87<br>87          | 523<br>524 | 0<br>50   | r                  | p        | 3/11/29<br>3/11/29 | 27.8<br>26.5     | 36.1<br>36.1       | 8.28<br>8.26 | 17<br>20                   |
| 87                | 525        | 100       | r                  | p<br>p   | 3/11/29            | 23.9             | 36.0               | 8.23         | 20                         |
| 89                | 531        | 100       | r                  | p        | 3/23/29            | 26.4             | 36.0               | 8.24         | 12                         |
| 90                | 533        | 0         | r                  | 'n       | 3/25/29            | 28.5             | 35.5               | 8.27         | 21                         |
| 90                | 535        | 0         | r                  | p        | 3/25/29            | 28.5             | 35.5               | 8.27         | 21                         |
| 90<br>91          | 536        | 50<br>50  | r                  | p        | 3/25/29<br>3/27/29 | 28.6<br>28.5     | 35.6<br>35.2       | 8.26<br>8.30 | 21<br>24                   |
| 91                | 541<br>542 | 0         | r                  | n<br>p   | 3/27/29            | 28.7             | 35.1               | 8.30         | 21                         |
| 91                | 543        | 50        | r                  | p        | 3/27/29            | 28.5             | 35.2               | 8.30         | 24                         |
| 92                | 548        | 50        | r                  | p        | 3/29/29            | 28.4             | 35.4               | 8.29         | 28                         |
| 93                | 553        | 100       | r                  | p        | 3/31/29            | 27.6             | 35.8               | 8.27         | 29                         |
| 96                | 572        | 50        | r                  | p        | 4/26/29            | 29.2<br>26.3     | 35.3<br>35.3       | 8.23<br>8.24 | 12                         |
| 101<br>102        | 606<br>612 | 0         | r                  | p        | 5/ 7/29<br>5/ 9/29 | 25.8             | 35.0               | 8.24         | 8                          |
| 102               | 613        | 50        | r                  | p<br>p   | 5/ 9/29            | 25.8             | 35.0               | 8.24         | 8                          |
| 104               | 624        | 0         | ос                 | p        | 5/13/29            | 26.1             | 35.2               | 8.24         | 8 7                        |
| 104               | 626        | 100       | oc                 | p        | 5/13/29            | 25.3             | 35.3               | 8.21         | 7                          |
| 105               | 630        | 0         | oc                 | p        | 5/19/29            | 26.9             | 34.9               | 8.23         | 5                          |
| 105<br>106        | 631<br>635 | 50<br>100 | r                  | p<br>n   | 5/19/29<br>5/17/29 | 26.8<br>25.6     | 34.9<br>35.1       | 8.23<br>8.23 | 5<br>5<br>5<br>5<br>5<br>4 |
| 106               | 636        | 0         | r                  | p        | 5/17/29            | 27.2             | 35.0               | 8.23         | 5                          |
| 106               | 637        | 50        | r                  | p        | 5/17/29            | 27.0             | 35.0               | 8.23         | 5                          |
| 107               | 642        | 0         | r                  | p        | 5/19/29            | 28.0             | 34.4               | 8.23         | 5                          |
| 107               | 645        | 50        | 0 L                | p        | 5/19/29            | 27.9             | 34.4               | 8.23         |                            |
| 108               | 647<br>648 | 50<br>100 | r                  | n        | 5/27/29<br>5/27/29 | 26.8<br>25.2     | 35.0<br>35.0       | 8.24<br>8.23 | 4 4                        |
| 108<br>110        | 665        | 50        | r<br>oc            | n<br>p   | 5/31/29            | 18.4             | 35.0               | 8.16         | 7                          |
| 110               | 666        | 100       | oc                 | p        | 5/31/29            | 17.9             | 34.7               | 8.14         | 11                         |
| 111               | 671        | 0         | oc                 | p        | 5/31/29            | 17.9             | 34.7               | 8.14         | 11                         |
| 111               | 672        | 50        | r                  | p        | 5/31/29            | 19.4             | 34.6               | 8.17         | 11                         |
| 112               | 675        | 50        | r                  | n        | 6/5/29             | 21.7             | 34.6               | 8.23<br>8.22 | 77                         |
| 112<br>112        | 677<br>678 | 0<br>50   | r                  | p<br>p   | 6/ 5/29<br>6/ 5/29 | 23.2<br>21.7     | 34.6<br>34.6       | 8.23         | 7                          |
| TIM               | 010        | 00        |                    | •        |                    |                  | 51.5               |              |                            |
|                   |            |           |                    | Subspeci | les pacific        | crim             |                    |              |                            |
| 118               | 719        | ••••      | r                  |          | 7/ 5/29            | 7.2              | 33.0               | 7.98         | 137                        |
| 120               | 729        | 0<br>50   | r                  | p        | 7/ 9/29 7/ 9/29    | 2.2              | 33.1               | 7.90         | 177                        |
| 120<br>121        | 730<br>732 | 0         | r                  | p<br>n   | 7/11/29            | 7.5              | 32.9               | 7.98         | 141                        |
| 121               | 735        | ő         | OE                 | p        | 7/11/29            | 7.5              | 32.9               | 7.98         | 141                        |
| 122               | 738        | 0         | r                  | p        | 7/13/29            | 8.2              | 32.8               | 7.98         | 130                        |
| 122               | 741        | 0         | r                  | n        | 7/13/29            | 8.2              | 32.8               | 7.98<br>7.94 | 130<br>150                 |
|                   | PEAC       | 50        | ОС                 | p        | 7/15/29            | 4.4<br>8.1       | 32.9<br>32.8       | 8.03         | 113                        |
| 123               | 745        |           | _                  |          |                    |                  |                    |              |                            |
| 123<br>123        | 747        | 0         | DC T               | n<br>n   | 7/15/29            | 9.3              | 32.7               | 8.04         | 113                        |
| 123<br>123<br>124 | 747<br>749 | 0         | ос                 | n        | 7/17/29            | 9.3<br>9.3       | 32.7<br>32.7       | 8.04<br>8.04 | 113<br>103                 |
| 123<br>123        | 747        | 0         |                    |          |                    | 9.3              | 32.7               | 8.04         | 113                        |

Table 9. Distributional and environmental records for Ceratium pentagonum -- Concluded

| Station | Sample      | Depth | Relative  | Appa-     |           | Mamamadan           | CT - 31 14         |      |                                      |
|---------|-------------|-------|-----------|-----------|-----------|---------------------|--------------------|------|--------------------------------------|
|         |             | (m)   | abundance | ratus     | Date      | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|         |             |       |           |           |           |                     |                    |      |                                      |
|         |             |       | Subspe    | ecies pad | cificum C | Concluded           |                    |      |                                      |
| 125     | 756         | 50    | oc        | n         | 7/19/29   | 5.5                 | 32.8               | 7.98 | 138                                  |
| 125     | 757         | 100   | ос        | n         | 7/19/29   | 4.2                 | 32.9               | 7.90 | 175                                  |
| 125 .   | 758         | 0     | С         | р         | 7/19/29   | 10.5                | 32.8               | 8.03 | 125                                  |
| 125     | <b>75</b> 9 | 50    | oc        | p         | 7/19/29   | 5.5                 | 32.8               | 7.98 | 138                                  |
|         |             |       | Suber     | necies te | nerumC    | oncluded            |                    |      |                                      |
| 132     | 803         | 100   | r         | p         | 9/ 8/29   | 14.3                | 33.4               | 8.30 | 16                                   |
| 133     | 804         | 0     | r         | n         | 9/10/29   | 22.7                | 34.7               | 8.47 | 7                                    |
| 134     | 815         | ŏ     | r         | p         | 9/12/29   | 22.9                | 34.7               | 8.34 | 6                                    |
| 135     | 821         | 50    | r         | n         | 9/14/29   | 21.5                | 35.0               | 8.37 | 5                                    |
| 135     | 825         | 50    | r         | p         | 9/14/29   | 21.5                | 35.0               | 8.37 | 5                                    |
| 135     | 826         | 100   | r         | p         | 9/14/29   | 18.7                | 34.8               | 8.34 | 5                                    |
| 136     | 829         | 100   | r         | n         | 9/16/29   | 18.6                | 35.0               | 8.39 | ă                                    |
| 136     | 833         | 50    | r         | p         | 9/16/29   | 21.4                | 35.1               | 8.39 | ă                                    |
| 138     | 847         | 0     | r         | p         | 9/20/29   | 26.1                | 34.8               | 8.35 | 3                                    |
| 138     | 848         | 50    | r         | p         | 9/20/29   | 25.6                | 34.7               | 8.30 | ğ                                    |
| 139     | 850         | 50    | r         | . n       | 9/22/29   | 25.8                | 34.9               | 8.31 | 6                                    |
| 139     | 851         | 100   | r         | n         | 9/22/29   | 22.4                | 35.2               | 8.28 | 6                                    |
| 139     | 854         | 50    | r         | p         | 9/22/29   | 25.8                | 34.9               | 8.31 | 6                                    |
| 139     | 855         | 100   | r         | p         | 9/22/29   | 22.4                | 35.2               | 8.28 | .6                                   |
| 141     | 864         | 0     | r         | n         | 10/ 5/29  | 25.9                | 35.2               | 8.28 | 5                                    |
| 141     | 865         | 50    | r         | n         | 10/ 5/29  | 24.8                | 35.3               | 8.28 | 5                                    |
| 141     | 871         | 100   | r         | p         | 10/ 5/29  | 20.0                | 35.0               | 8.33 | 5                                    |
| 143     | 884         | 0     | r         | p         | 10/ 9/29  | 22.4                | 34.4               | 8.30 | 6                                    |
| 143     | 885         | 50    | r         | p         | 10/ 9/29  | 19.0                | 34.2               | 8.34 | 6                                    |
| 146     | 900         | 0     | r         | p         | 10/15/29  | 22.4                | 34.9               | 8.37 | 6                                    |
| 146     | 902         | 100   | r         | p         | 10/15/29  | 19.7                | 34.3               | 8.26 | 7                                    |
| 147     | 904         | 50    | r         | n         | 10/17/29  | 23.1                | 35.3               | 8.29 | 5553333666655566675                  |
| 147     | 907         | ő     | r         | p         | 10/17/29  | 23.3                | 35.3               | 8.26 | 8                                    |
| 147     | 908         | 50    | r         | p         | 10/17/29  | 19.2                | 35.0               | 8.29 | 5                                    |
| 148     | 911         | 50    | r         | n         | 10/19/29  | 23.0                | 35.1               | 0.20 |                                      |
| 148     | 917         | ő     | oc        | p.        | 10/19/29  | 23.4                | 35.2               |      | •••                                  |
| 149     | 921         | 50    | r .       | n.        | 10/21/29  | 23.3                | 35.0               | 8.37 | 6                                    |
| 149     | 927         | ő     | oc .      | p         | 10/21/29  | 23.5                | 35.0               | 8.34 | 6                                    |
| 150     | 931         | 100   | r         | n         | 10/23/29  | 19.6                | 34.6               | 8.32 | 6                                    |
| 150     | 936         | 100   | r         | p         | 10/23/29  | 19.6                | 34.6               | 8.32 | 6                                    |
| 151     | 941         | 0     | r         | p         | 10/26/29  | 26.0                | 34.0               | 0.02 |                                      |
| 152     | 946         | 100   | r         | n         | 10/27/29  | 11.4                | 34.7               | 7.76 | 75                                   |
| 152     | 948         | 0     | r         | p         | 10/27/29  | 27.4                | 33.7               | 8.35 | 20                                   |

Table 10. Distributional and environmental records for Ceratium subrobustum

| Station | Sample | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | рН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|--------------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
|         |        |              |                    |                |          |                     |                    |      |                                      |
| 15      | 102    | 100          | r                  | n              | 8/11/28  | 18.4                | 36.4               | 8.20 | 19                                   |
| 19      | 123    | 50           | oc                 | n              | 8/20/28  | 25.2                | 27.1               | 8.27 | 5                                    |
| 47      | 268    | 100          | r                  | n              | 11/23/28 | 22.7                | 36.2               | 8.23 | 20                                   |
| 48      | 273    | 100          | · oc               | n              | 11/25/28 | 22.7                | 36.3               | 8.26 | 16                                   |
| 48      | 276    | 100          | r                  | · p            | 11/25/28 | 22.7                | 36.3               | 8.26 | 16                                   |
| 49      | 279    | .100         | ос                 | 'n             | 11/27/28 | 21.6                | 35.9               | 8.26 | 13                                   |
| 49      | 282    | 100          | r                  | p              | 11/27/28 | 21.6                | 35.9               | 8.26 | 13                                   |
| 50      | 286    | 100          | r                  | 'n             | 11/29/28 | 20.5                | 35.7               | 8.22 | 13                                   |
| 51      | 298    | 100          | r                  | р              | 12/ 1/28 | 20.0                | 35.6               | 8.22 | 17                                   |
| 53      | 305    | 100          | r                  | n              | 12/ 5/28 | 19.9                | 35.6               | 8.19 | 13                                   |
| 54      | 321    | 100          | r                  | n              | 12/14/28 | 18.7                | 35.4               | 8.16 | 20                                   |
| 55      | 324    | 50           | oc                 | n              | 12/16/28 | 18.7                | 35.0               | 8.18 | 12                                   |
| 55      | 325    | 100          | r                  | n              | 12/16/28 | 16.7                | 34.9               | 7.17 | 12                                   |
| 56 ·    | 330    | 100          | oc                 | n              | 12/18/28 | 16,6                | 34.8               | 8.11 | 12                                   |
| 57      | 337    | 100          | oc                 | n              | 12/20/28 | 14.3                | 34.4               | 8.10 | 40                                   |
| 57      | 340    | 100          | r                  | р              | 12/20/28 | 14.3                | 34.4               | 8.10 | 40                                   |
| 58      | 342    | 50           | r                  | n              | 12/22/28 | 14.8                | 34.0               | 8.12 | 25                                   |
| 58      | 345    | 50           | r                  | p              | 12/22/28 | 14.8                | 34.0               | 8.12 | 25                                   |
| 75      | 462    | 0            | r                  | n              | 2/14/29  | 22.8                | <b>35.</b> 8       | 8.18 | 44                                   |
| 76      | 468    | 50           | r                  | n              | 2/16/29  | 22.1                | 35.9               | 8.14 | 42                                   |
| 76      | 469    | 100          | r                  | n              | 2/16/29  | 21.2                | 35.8               | 8.12 | 45                                   |
| 77      | 472    | 0            | r                  | n              | 2/18/29  | 23.7                | 36.0               | 8.19 | 16                                   |
| 77      | 473    | 0            | r                  | p              | 2/18/29  | 23.7                | 36.0               | 8.19 | 16                                   |
| 77      | 474    | 50           | r                  | p              | 2/18/29  | 23.5                | 36.0               | 8.19 | 16                                   |
| 78      | 477    | 100          | r                  | n              | 2/20/29  | 24.6                | 36.0               | 8.17 | 32                                   |
| 94      | 559    | 100          | r                  | n              | 4/22/29  | 28.5                | 35.6               | 8.21 | 25                                   |

Table 10. Distributional and environmental records for Ceratium subrobustum -- Concluded

| Station    | Sample                     | Depth (m)  | Relative abundance | Appa-  | Date                 | Temperature<br>(°C) | Salinity     | pН   | PO4                                  |
|------------|----------------------------|------------|--------------------|--------|----------------------|---------------------|--------------|------|--------------------------------------|
|            |                            | (ш)        | abulidance         | ratus  |                      | ( 0)                | (0/00)       | L    | mg/m <sup>3</sup>                    |
| 0.77       | 575                        | EO         | _                  |        | 4 (00 (00            | 00.0                | 05.4         | 0.40 |                                      |
| 97         | 575                        | 50         | r                  | n      | 4/28/29              | 28.0                | 35.4         | 8.16 | 21                                   |
| 97         | 576                        | 100        | r                  | n      | 4/28/29              | 27.6                | 35.6         | 8.15 | 25                                   |
| 97         | 577                        | 0          | r                  | p      | 4/28/29              | 28.3                | 35.2         | 8.16 | 24                                   |
| 97         | 579                        | 100        | r                  | p      | 4/28/29              | 27.6                | 35.6         | 8.15 | 25                                   |
| 98         | 584                        | 0          | r                  | p      | 4/30/29              | 27.0                | 35.3         | 8.16 | 24                                   |
| 98         | 585                        | 50         | r                  | p      | 4/30/29              | 26.9                | 35.3         | 8.16 | 28                                   |
| 99         | 589                        | 0          | r                  | n      | 5/ 2/29              | 27.9                | 34.9         | 8.21 | 12                                   |
| 99         | 590                        | 50         | r                  | n      | 5/ 2/29              | 27.8                | 34.9         | 8.22 | 12                                   |
| 99         | 591                        | 100        | r                  | n      | 5/ 2/29              | 27.8                | 35.0         | 8.22 | 17                                   |
| 99         | 592                        | 0          | oc                 | p      | 5/ 2/29              | 27.9                | 34.9         | 8.21 | 12                                   |
| 99         | 595                        | 0          | r                  | n      | 5/ 2/29              | 27.9                | 34.9         | 8.21 | 12                                   |
| 100        | 596                        | 50         | r                  | n      | 5/ 4/29              | 27.6                | 34.7         | 8.21 | 10                                   |
| 100        | 597                        | 100        | oc                 | n      | 5/ 4/29              | 27.6                | 34.7         | 8.22 | 12                                   |
| 100        | 599                        | 50         | r                  | p      | 5/ 4/29              | 27.6                | 34.7         | 8.21 | 10                                   |
| 100        | 602                        | 100        | r                  | p      | 5/ 4/29              | 27.6                | 34.7         | 8.22 | 12                                   |
| 109        | 656                        | 100        | r                  | n      | 5/29/29              | 19.4                | 34.8         | 8.18 | 5                                    |
| 109        | 658                        | 50         | r                  | p      | 5/29/29              | 23.1                | 35.0         | 8.22 | 3                                    |
| 109        | 659                        | 100        | r                  | p      | 5/29/29              | 19.4                | 34.8         | 8.18 | 5                                    |
| 111        | 668                        | 0          | r                  | n      | 6/ 3/29              | 20.1                | 34.5         | 8.18 | 5                                    |
| 113        | 684                        | 50         | r                  | p      | 6/25/29              | 23.8                | 34.6         | 8.25 | 5<br>3<br>5<br>5<br>7                |
| 114        | 689                        | 0          | г                  | p      | 6/27/29              | 19.9                | 34.3         | 8.15 | 7                                    |
| 115        | 695                        | 0          | r                  | p      | 6/29/29              | 20.6                | 34.6         | 8.19 | 4                                    |
| 133        | 805                        | 50         | r                  | n      | 9/10/29              | 20.8                | 34.7         | 8.37 | 7                                    |
| 134        | 817                        | 100        | r                  | p      | 9/12/29              | 18.1                | 34.6         | 8.34 | 6                                    |
| 136        | 829                        | 100        | r                  | n      | 9/16/29              | 18.6                | 35.0         | 8.39 | 3                                    |
| 137        | 841                        | 50         | r                  | p      | 9/18/29              | 29.4                | 35.1         | 8.34 | 6<br>3<br>4<br>6<br>7<br>7<br>5<br>7 |
| 139        | 851                        | 100        | r                  | n      | 9/22/29              | 22.4                | 35.2         | 8.28 | 6                                    |
| 139        | 855                        | 100        | r                  | p      | 9/22/29              | 22.4                | 35.2         | 8.28 | 6                                    |
| 140<br>140 | 858                        | 100<br>100 | r                  | n      | 10/ 3/29             | 25.5                | 35.0         | 8.34 | 7                                    |
| 142        | 8 <b>62</b><br>8 <b>73</b> | 50         | r                  | p      | 10/ 3/29             | 25.5<br>21.8        | 35.0         | 8.34 |                                      |
| 142        | 874                        | 100        | r                  | n      | 10/ 7/29             | 16.6                | 34.8<br>34.4 | 8.30 | 5                                    |
| 142        | 878                        | 100        | c<br>r             | n      | 10/ 7/29<br>10/ 7/29 | 16.6                | 34.4         | 8.27 | 177                                  |
| 142        | 879                        | 100        | r                  | p      | 10/ 7/29             | 16.6                | 34.4         | 8.27 | í<br>17                              |
| 144        | 888                        | 50         |                    | p      | 10/11/29             | 21.1                |              | 8.27 | e e                                  |
| 144        | 889                        | 100        | oc<br>oc           | p      | 10/11/29             | 16.6                | 34.7<br>34.5 | 8.37 | 6                                    |
| 145        | 891                        | 50         | c                  | p<br>n | 10/11/29             | 18.7                | 34.3         | 8.34 | 6                                    |
| 145        | 892                        | 100        | OE.                | n      | 10/13/29             | 16.0                | 34.1         | 8.31 | 6                                    |
| 145        | 894                        | 50         | r                  | р      | 10/13/29             | 18.7                | 34.3         | 8.34 | 7<br>6<br>6<br>6<br>6<br>6           |
| 145        | 895                        | 100        | r                  |        | 10/13/29             | 16.0                | 34.1         | 8.31 | 6                                    |
| 146        | 897                        | 50         | 00                 | p<br>n | 10/15/29             | 22.4                | 34.9         | 8.30 | 6                                    |
| 147        | 905                        | 100        | r                  | n      | 10/15/29             | 19.7                | 34.3         | 8.26 | 7                                    |
| 149        | 922                        | 100        | r                  | n      | 10/15/29             | 19.7                | 34.3         | 8.26 | 7                                    |
| 151        | 939                        | 100        | r                  | n      | 10/26/29             | 12.5                | 34.6         |      |                                      |
| 153        | 957                        | 100        | r                  | p      | 10/29/29             | 20.5                | 34.7         | 8.28 | 31                                   |
| 155        | 965                        | 0          | r                  | n      | 11/ 2/29             | 27.8                | 34.9         | 8.29 | 29                                   |
| 155        | 966                        | 50         | r                  | n      | 11/ 2/29             | 27.7                | 34.9         | 8.30 | 30                                   |
| 155        | 967                        | 100        | oc                 | n      | 11/ 2/29             | 27.2                | 35.0         | 8.30 | 35                                   |
| 155        | 973                        | 50         | oc                 | p      | 11/ 2/29             | 27.7                | 34.9         | 8.30 | 30                                   |
| 156        | 972                        | 0          | r                  | n      | 11/ 4/29             | 27.6                | 35.0         | 8.34 | 28                                   |
| 156        | 974                        | 100        | r                  | n      | 11/ 4/29             | 26.4                | 35.1         | 8.30 | 48                                   |
| 157        | 978                        | 0          | c                  | n      | 11/ 6/29             | 27.1                | 35.3         | 8.27 | 47                                   |
| 157        | 979                        | 50         | ос                 | n      | 11/ 6/29             | 27.1                | 35.2         | 8.32 | 60                                   |
| 157        | 980                        | 100        | Г                  | n      | 11/6/29              | 26.8                | 35.5         | 8.30 | 64                                   |
| 158        | 985                        | 100        | r                  | n      | 11/ 8/29             | 27.6                | 35.9         | 8.39 | 48                                   |
|            |                            |            |                    |        |                      |                     |              |      |                                      |

Table 11. Distributional and environmental records for Ceratium teres

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date      | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|-----------|---------------------|--------------------|------|--------------------------------------|
| 15      | 102    | 100       | _                  | -              | 0 /11 /00 | 10.4                | 20.4               | 0.00 | 10                                   |
|         |        |           | r                  | n              | 8/11/28   | 18.4                | 36.4               | 8.20 | 19                                   |
| 17      | 109    | 0         | r                  | p              | 8/15/28   | 26.2                | 36.6               | 8.29 | 9                                    |
| 18      | 114    | 0         | OE                 | p              | 8/17/28   | 27.0                | 37.0               | 8.23 | 5                                    |
| 18      | 115    | 50        | r                  | p              | 8/17/28   | 22.4                | 36.8               | 8.24 | 5                                    |
| 18      | 118    | 50        | r                  | n              | 8/17/28   | 22.4                | 36.8               | 8.24 | 5                                    |
| 19      | 121    | 50        | r                  | p              | 8/20/28   | 25.2                | 37.1               | 8.27 | 5                                    |
| 19      | 123    | 50        | r                  | n              | 8/20/28   | 25.2                | 37.1               | 8.27 | 5                                    |
| 20      | 127    | 100       | r                  | p              | 8/22/28   | 22.6                | 36.7               | 8.19 | 5                                    |
| 20      | 130    | 100       | r                  | n              | 8/22/28   | 22.6                | 36.7               | 8.19 | 5                                    |
| 20-21   | 131    | 0         | r                  | n              | 8/23/28   | (26.6               | 36.3               | 8.32 | 4)                                   |
| 21      | 134    | 100       | r                  | p              | 8/24/28   | 21.0                | 36.8               | 8.20 | 7                                    |

Table 11. Distributional and environmental records for Ceratium teres--Continued

|   |  |                                   |                                     | IIVII OIIII      | emai reco  | rds for Ceratium                             | n teresC                                     | ontinue                                      |   |
|---|--|-----------------------------------|-------------------------------------|------------------|--|--|--|--|---|
| Station                                       | Sample   | Depth (m)                         | Relative abundance                  | Appa-            | Date   | Temperature                                  | Salinity                                     | pН   | PO <sub>4</sub>                           |
|   |  | (111)                             | abundance                           | ratus            |  | (°C)   | (0/00)                                       | 1  | mg/m <sup>3</sup>                         |
| 21  | 137  | 100                               | r                                   | n                | 8/24/28  | 21.0   | 36.8   | 8.20   | 7   |
| 22  | 140  | 50                                | r                                   | p                | 8/27/28  | 24.5   | 36.2   | 8.21   | 9   |
| 22  | 143  | 50                                | r                                   | n                | 8/27/28  | 24.5   | 36.2   | 8.21   | 9   |
| 22<br>23                                      | 144<br>145   | 100                               | r                                   | n                | 8/27/28  | 17.5   | 36.1   | 7.99   | 123                                       |
| 23  | 149  | 50                                | oc<br>r                             | p<br>n           | 8/29/28<br>8/29/28   | 27.2<br>20.9                                 | 35.9<br>36.0                                 | 8.25   | 4   |
| 24  | 151  | 0                                 | r                                   | p                | 8/31/28  | 27.2   | 35.2   | 8.14<br>8.32                                 | 13<br>4                                   |
| 24  | 152  | 50                                | r                                   | p                | 8/31/28  | 23.1   | 36.0   | 8.14   | 8   |
| 30<br>32                                      | 189<br>194A  | 50                                | r                                   | n                | 9/15/28  | 27.8   | 36.1   | 8.29   | 3   |
| 46  | 262  | 0<br>50                           | r                                   | p<br>n           | 10/ 5/28<br>11/21/28   | 28.0   | 36.0   | 8.23   | 2   |
| 46  | 263  | 100                               | oc                                  | n                | 11/21/28   | 23.2<br>22.5                                 | 35.3<br>35.4                                 | 8.16<br>8.17                                 | 40<br>40                                  |
| 46  | 264  | 0                                 | r                                   | p                | 11/21/28   | 23.3   | 35.3   | 8.16   | 36  |
| 47  | 270  | 50                                | r                                   | p                | 11/23/28   | 23.8   | 36.0   | 8.23   | 20  |
| 48<br>49                                      | 276<br>279   | 100<br>100                        | r                                   | p                | 11/25/28   | 22.7   | 36.3   | 8.26   | 16  |
| 49  | 281  | 50                                | r                                   | n<br>p           | 11/27/28<br>11/27/28   | 21.6<br>22.6                                 | 35.9<br>36.1                                 | 8.26<br>8.26                                 | 13<br>13                                  |
| 50  | 289  | 100                               | ос                                  | p                | 11/29/28   | 20.5   | 35.7   | 8.22   | 13  |
| 50-51   | 290  | 0                                 | r                                   | n                | 11/30/28   | (22.8  | 35.6   | 8.22   | 16)                                       |
| 50-51<br>50-51                                | 291<br>292   | 0                                 | r                                   | n                | 11/30/28   | (22.8  | 35.6   | 8.22   | 16)                                       |
| 51  | 294  | 50                                | r                                   | n<br>n           | 11/30/28<br>12/ 1/28   | (22.8<br>20.5                                | 35.6<br>35.6                                 | 8.22<br>8.22                                 | 16)                                       |
| 51  | 297  | 50                                | r                                   | p                | 12/ 1/28   | 20.5   | 35.6   | 8.22   | 17<br>17                                  |
| 54  | 322  | 0                                 | r                                   | p                | 12/14/28   | 23.4   | 35.5   | 8.22   | 9   |
| 57<br>58                                      | 338<br>342   | 0<br>50                           | r                                   | p                | 12/20/28   | 19.0   | 34.5   | 8.14   | 20  |
| 58  | 344  | 0                                 | r                                   | n<br>p           | 12/22/28<br>12/22/28   | 14.8<br>17.0                                 | 34.0<br>34.0                                 | 8.12<br>8.12                                 | 25<br>20                                  |
| 58  | 345  | 50                                | oc                                  |                  | 12/22/28   | 14.8   | 34.0   | 8.12   | 25  |
| 59  | 348  | 0                                 | r                                   | n                | 12/24/28   | 16.3   | 34.0   | 8.10   | 38  |
| 59<br>59                                      | 350<br>351   | 100                               | oc                                  |                  | 12/24/28   | 11.4   | 34.1   | 8.03   | 72  |
| 59  | 352  | 0<br>50                           | oc                                  |                  | 12/24/28<br>12/24/28   | 16.3<br>14.0                                 | 34.0   | 8.10   | 38  |
| 60  | 357  | 0                                 | r                                   |                  | 12/26/28   | 15.0   | 34.0<br>34.0                                 | 8.08   | 38<br>50                                  |
| 60-61   | 360  | 0                                 | r                                   | n                | 12/26/28   | (15.0  | 34.0   | 8.07   | 50)                                       |
| 60-61   | 361  | 0                                 | r                                   |                  | 12/26/28   | (15.0  | 34.0   | 8.07   | 50)                                       |
| 67<br>68                                      | 416<br>422   | 0                                 | r                                   | n                | 1/ 8/29<br>1/10/29   | 19.3<br>19.2                                 | 34.9   | 8.11   | 21  |
| 80-   | 489  | 50                                | r                                   | p<br>p           | 2/24/29  | 25.9   | 35.1<br>36.0                                 | 8.14<br>8.19                                 | 29<br>29                                  |
| 80  | 490  | 100                               | r                                   | p                | 2/24/29  | 23.4   | 36.2   | 8.16   | 32  |
| 81  | 493  | 0                                 | r                                   | p                | 2/26/29  | 26.5   | 35.8   | 8.19   | 38  |
| 81<br>85                                      | 495<br>512   | 100                               | r                                   | p                | 2/26/29<br>3/6/29  | 23.6   | 36.2   | 8.18   | 36  |
| 87  | 523  | ŏ                                 | r<br>r                              | p<br>p           | 3/11/29  | 27.9<br>27.8                                 | 36.2<br>36.1                                 | 8.22<br>8.28                                 | 40<br>17                                  |
| 87  | 524  | 50                                | r                                   | p                | 3/11/29  | 26.5   | 36.1   | 8.26   | 20  |
| 89  | 530  | 0                                 | r                                   | p                | 3/23/29  | 28.4   | 35.6   | 8.25   | 21  |
| 90<br>90                                      | 536<br>537   | 50<br>100                         | r                                   | p                | 3/25/29<br>3/25/29   | 28.6   | 35.6   | 8.26   | 21  |
| 91  | 542  | 0                                 | oc                                  | p<br>p           | 3/27/29  | 26.3<br>28.7                                 | 35.8<br>35.1                                 | 8.24<br>8.30                                 | 21<br>21                                  |
| 91  | 544  | 100                               | r                                   | p                | 3/27/29  | 25.8   | 36.0   | 8.25   | 30  |
| 92  | 547  | 0                                 | r                                   | p                | 3/29/29  | 28.5   | 35.3   | 8.29   | 28  |
| 92<br>93                                      | 549<br>552   | 100                               | oc<br>oc                            | p                | 3/29/29<br>3/31/29   | 26.2<br>28.7                                 | 36.0<br>34.7                                 | 8.28<br>8.30                                 | 28<br>28                                  |
| 93  | 553  | 100                               | oc '                                | p<br>p           | 3/31/29  | 27.6   | 35.8   | 8.27   | 29  |
| 94  | 562  | 100                               | r                                   | p                | 4/22/29  | 28.5   | 35.6   | 8.21   | 25  |
| 95<br>95                                      | 565<br>566   | 0<br>50                           | r                                   | p                | 4/24/29  | 29.4   | 34.7   | 8.26   | 14  |
| 95  | 567  | 100                               | r                                   | p<br>p           | 4/24/29 4/24/29  | 29.3<br>28.5                                 | 34.9<br>35.4                                 | 8.24<br>8.22                                 | 16<br>21                                  |
| 96  | 573  | 100                               | r                                   | p                | 4/26/29  | 28.2   | 35.7   | 8.19   | 25  |
| 97  | 577  | 0                                 | oc                                  | p                | 4/28/29  | 28.3   | 35.2   | 8.16   | 24  |
| 97<br>99                                      | 578<br>593   | 50                                | oc                                  | p                | 4/28/29  | 28.0   | 35.4   | 8.16   | 21  |
| 100   | 598  | 50<br>0                           | r                                   | p<br>p           | 5/ 2/29<br>5/ 4/29   | 27.8<br>27.7                                 | 34.9<br>34.7                                 | 8.22<br>8.21                                 | 12<br>10                                  |
| 100   | 602  | 100                               | oc                                  | p                | 5/ 4/29  | 27.6   | 34.7   | 8.22   | 12  |
| 101   | 606  | 0                                 | r                                   | p                | 5/ 7/29  | 26.3   | 34.7   | 8.24   | 8 8                                       |
| 14179   |  | 50                                | r                                   | n                | 5/ 9/29<br>5/ 9/29   | 25.8<br>25.8                                 | 35.0   | 8.24   | 8   |
| 102   | 610  | 50                                |                                     |                  |  | 73 X   | 4Pa []                                       | 8.24   |   |
| 102   | 610<br>612   | 0                                 | Г                                   | p                | 5/ 9/29  |  | 35.0<br>35.0                                 |  | 8   |
| 102<br>102<br>103                             | 610  |                                   | oc                                  | p                | 5/ 9/29  | 25.6   | 35.0   | 8.23   | 8<br>8<br>5                               |
| 102<br>102<br>103<br>103                      | 610<br>612<br>614<br>616<br>618                      | 0<br>100<br>50<br>0               | r<br>oc<br>r<br>oc                  |                  | 5/ 9/29<br>5/11/29<br>5/11/29                                  | 25.6<br>25.8<br>26.0                         | 35.0<br>35.2<br>35.0                         | 8.23<br>8.25<br>8.25                         | 8<br>8<br>5<br>5                          |
| 102<br>102<br>103<br>103<br>103               | 610<br>612<br>614<br>616<br>618<br>620               | 0<br>100<br>50<br>0<br>100        | r<br>oc<br>r<br>oc<br>r             | p<br>n<br>p<br>p | 5/ 9/29<br>5/11/29<br>5/11/29<br>5/11/29                       | 25.6<br>25.8<br>26.0<br>24.8                 | 35.0<br>35.2<br>35.0<br>35.2                 | 8.23<br>8.25<br>8.25<br>8.25                 | 8<br>5<br>5<br>5                          |
| 102<br>102<br>103<br>103<br>103<br>104        | 610<br>612<br>614<br>616<br>618<br>620<br>626        | 0<br>100<br>50<br>0<br>100<br>100 | r<br>oc<br>r<br>oc<br>r             | p<br>n<br>p<br>p | 5/ 9/29<br>5/11/29<br>5/11/29<br>5/11/29<br>5/13/29            | 25.6<br>25.8<br>26.0<br>24.8<br>25.3         | 35.0<br>35.2<br>35.0<br>35.2<br>35.3         | 8.23<br>8.25<br>8.25<br>8.25<br>8.25         | 8<br>5<br>5<br>5<br>7                     |
| 102<br>102<br>103<br>103<br>103<br>104<br>105 | 610<br>612<br>614<br>616<br>618<br>620               | 0<br>100<br>50<br>0<br>100        | r<br>oc<br>r<br>oc<br>r<br>oc<br>oc | p<br>n<br>p<br>p | 5/ 9/29<br>5/11/29<br>5/11/29<br>5/11/29<br>5/13/29<br>5/15/29 | 25.6<br>25.8<br>26.0<br>24.8<br>25.3<br>26.9 | 35.0<br>35.2<br>35.0<br>35.2<br>35.3<br>34.9 | 8.23<br>8.25<br>8.25<br>8.25<br>8.21<br>8.23 | 8<br>8<br>5<br>5<br>5<br>7<br>5<br>5<br>5 |
| 102<br>102<br>103<br>103<br>103<br>104<br>105 | 610<br>612<br>614<br>616<br>618<br>620<br>626<br>630 | 0<br>100<br>50<br>0<br>100<br>100 | r<br>oc<br>r<br>oc<br>r             | p<br>n<br>p<br>p | 5/ 9/29<br>5/11/29<br>5/11/29<br>5/11/29<br>5/13/29            | 25.6<br>25.8<br>26.0<br>24.8<br>25.3         | 35.0<br>35.2<br>35.0<br>35.2<br>35.3         | 8.23<br>8.25<br>8.25<br>8.25<br>8.25         | 8 8 5 5 5 7 5 5 4 5                       |

Table 11. Distributional and environmental records for Ceratium teres--Concluded

| Station   | Sample   | Depth (m) | Relative abundance                             | Appa-<br>ratus                          | Date  | Ter | nperature<br>(°C)  | Salinity<br>(o/oo)  | рН   | PO4<br>mg/m <sup>3</sup>                         |
|---|--|-----------|--|---|---|-----|--|---|--|--|
| 109<br>112<br>112<br>112<br>115<br>132<br>134<br>136<br>136<br>141<br>142<br>144<br>145<br>146<br>146<br>147<br>148 | 660<br>675<br>676<br>677<br>692<br>801<br>815<br>828<br>832<br>833<br>869<br>876<br>887<br>893<br>901<br>902<br>907<br>918 |           | abundance  r r r r r r r r r r r r r r r r r r | p n n p p p p p p p p p p p p p p p p p | 5/29/29<br>6/ 5/29<br>6/ 5/29<br>6/ 5/29<br>6/ 5/29<br>9/ 8/29<br>9/16/29<br>9/16/29<br>9/16/29<br>10/ 5/29<br>10/11/29<br>10/13/29<br>10/15/29<br>10/15/29<br>10/17/29 |     | 27.4<br>21.7<br>19.8<br>23.2<br>20.6<br>21.0<br>22.9<br>21.4<br>24.6<br>21.4<br>24.8<br>24.1<br>23.3<br>22.3<br>22.4<br>19.7<br>23.3 | (o/oo)  35.0 34.6 34.7 34.6 33.9 34.7 35.1 35.3 34.8 35.0 34.6 34.9 34.3 35.3 | 8.23<br>8.23<br>8.20<br>8.19<br>8.34<br>8.34<br>8.39<br>8.37<br>8.39<br>8.34<br>8.39<br>8.34<br>8.39<br>8.34<br>8.30<br>8.20<br>8.20 | mg/m <sup>3</sup> 3 7 8 7 4 15 6 3 3 5 5 6 6 7 8 |
| 151<br>153  | 941<br>956   | 0<br>50   | r  | p<br>p                                  | 10/26/29<br>10/29/29  |     | 26.0<br>28.1   | 34.0<br>34.4  | 8.39   | 7  |

Table 12. Distributional and environmental records for Ceratium kofoidii

| Station   | Sample   | Depth (m)                                  | Relative abundance                     | Appa-<br>ratus                  | Date   | Temperature<br>(°C)  | Salinity<br>(o/oo)   | pН   | PO4<br>mg/m <sup>3</sup>                   |
|---|--|--|--|---------------------------------|--|--|--|--|--|
| 44<br>45<br>45<br>45<br>71<br>100<br>111<br>111<br>112<br>130 | 253<br>256<br>257<br>259<br>441<br>600<br>671<br>672<br>679<br>784 | 0<br>0<br>50<br>0<br>100<br>0<br>50<br>100 | r<br>r<br>r<br>oc<br>r<br>r<br>oc<br>r | p<br>n<br>n<br>p<br>p<br>p<br>p | 11/17/28<br>11/19/28<br>11/19/28<br>11/19/28<br>11/19/28<br>2/ 6/29<br>5/ 4/29<br>6/ 3/29<br>6/ 3/29<br>6/ 5/29<br>9/ 4/29 | 20.7<br>22.4<br>22.4<br>22.4<br>23.5<br>27.6<br>20.1<br>19.4<br>19.8<br>16.2 | 34.9<br>35.3<br>35.2<br>35.3<br>35.2<br>34.7<br>34.5<br>34.6<br>34.7<br>33.4 | 8.03<br>8.12<br>8.13<br>8.12<br>8.13<br>8.22<br>8.18<br>8.17<br>8.20<br>8.34 | 38<br>38<br>46<br>38<br>58<br>12<br>5<br>5 |
| 130<br>142  | 785<br>879   | 50<br>100                                  | r                                      | p<br>p                          | 9/ 4/29<br>10/ 7/29  | 11.7<br>16.6   | 33.4<br>34.4   | 8.26<br>8.27   | 83<br>7                                    |

Table 13. Distributional and environmental records for Ceratium böhmii

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | рН   | PO <sub>4</sub> mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|-----------------------------------|
| 40      | 230    | 50        | 'r                 | n              | 11/ 8/28 | 15.3                | 34.9               | 7.87 | 161                               |
| 40      | 232    | 0         | r                  | p              | 11/8/28  | 22.2                | 33.7               | 8.21 | 24                                |
| 40      | 234    | 100       | r                  | p              | 11/8/28  | 13.9                | 35.0               | 7.85 | 159                               |
| 42      | 243    | 100       | r                  | n              | 11/13/28 | 13.8                | 35.0               | 7.91 | 150                               |
| 98      | 585    | 50        | r                  | p              | 4/30/29  | 26.9                | 35.3               | 8.16 | 28                                |
| 99      | 589    | 0         | r                  | n              | 5/ 2/29  | 27.9                | 34.9               | 8.21 | 12                                |
| 99      | 594    | 100       | r                  | p              | 5/ 2/29  | 27.8                | 35.0               | 8.22 | 17                                |
| 114     | 689    | 0         | oc                 | p              | 6/27/29  | 19.9                | 34.3               | 8.15 | 7                                 |
| 114     | 690    | 50        | r                  | p              | 6/27/29  | 16.2                | 34.6               | 8.04 | 63                                |
| 115     | 695    | 0         | oc                 | p              | 6/29/29  | 20.6                | 34.6               | 8.19 | 4                                 |
| 115     | 696    | 0         | oc                 | p              | 6/29/29  | 20.6                | 34.6               | 8.19 | 4                                 |
| 115     | 698    | 100       | oc                 | p              | 6/29/29  | 15.6                | 34.6               | 8.08 | 27                                |

Table 14. Distributional and environmental records for Ceratium lineatum

| Station      | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
|--------------|------------|-----------|--------------------|----------------|--------------------|---------------------|--------------------|------|--------------------------|
| 3            | 20         | 0         | r                  | n              | 5/21/28            | 15.5                | 36.1               | 8.15 | 99                       |
| 4            | 23         | 100       | r                  | n              | 5/23/28            | 13.4                | 35.9               | 8.12 | 50                       |
| 6            | 37         | 100       | r                  | n              | 5/31/28            | 11.3                | 35.6               | 8.08 | 41                       |
| 6b           | 46         | 0         | r                  | n              | 5/31/28            | (12.4               | 35.6               | 8.15 | 21)                      |
| . 9          | 64         | 0         | r                  | n              | 7/28/28            | 11.2                | 35.1               | 8.08 | 20                       |
| 9            | 65         | 50        | oc                 | n              | 7/28/28            | 8.4                 | 35.1               | 7.96 | 55                       |
| 9            | 66         | 100       | r                  | n              | 7/28/28            | 7.6                 | 35.1               | 7.98 | 56                       |
| 10           | 68         | 0         | oc                 | n              | 7/30/28            | 10.9                | 34.9               | 8.08 | 28                       |
| 10           | 69         | 50        | oc                 | n              | 7/30/28            | 10.0                | 34.9               | 8.04 | 34                       |
| 10           | 70         | 100       | oc                 | n              | 7/30/28            | 6.6                 | 35.0               | 7.95 | 52                       |
| 11a          | 78         | 0 ,       | , oc               | n              | 8/ 1/28            | (10.7               | 34.9               | 8.06 | 27)                      |
| 13a          | 88         | 0         | r                  | n              | 8/ 9/28            | (21.2               | 35.2               | 8.18 | 11)                      |
| 17           | 111        | 0         | ос                 | n              | 8/16/28            | 26.2                | 36.6               | 8.29 | 9                        |
| 19           | 122<br>700 | 0         | r                  | n              | 8/20/28            | 26.6                | 37.0               | 8.34 | 9<br>5<br>4)<br>4<br>4   |
| 115a         | 702        | 0         | С                  | n              | 7/ 1/29            | (18.4               | 34.3               | 8.18 | 4)                       |
| 115a<br>115a | 705        | 0         | oc                 | n              | 7/ 1/29            | 16.1                | 34.0               | 8.17 | 4                        |
| 116          | 703        | 50        | oc                 | p              | 7/ 1/29<br>7/ 1/29 | 16.1<br>10.6        | 34.0<br>33.8       | 8.17 |                          |
| 116          | 704        | 100       | oc<br>oc           | n<br>n         | 7/ 1/29            | 6.7                 | 33.8               | 8.11 | 23                       |
| 116          | 706        | 50        | oc                 |                | 7/ 1/29            | 10.6                | 33.8               | 8.11 | 23                       |
| 116          | 707        | 100       | r                  | p<br>p         | 7/ 1/29            | 6.7                 | 33.8               |      |                          |
| 117          | 708        | 0         | r                  | n              | 7/ 3/29            | 15.9                | 34.3               | 8.17 | 3                        |
| 117          | 709        | 50        | oc                 | n              | 7/ 3/29            | 12.5                | 34.2               | 8.06 | 51                       |
| 117          | 710        | 100       | oc                 | n              | 7/ 3/29            | 8.8                 | 34.1               | 7.98 | 84                       |
| 117          | 711        | 0         | c                  | p              | 7/ 3/29            | 15.9                | 34.3               | 8.17 | 3                        |
| 117          | 712        | 50        | oc                 | p              | 7/ 3/29            | 12.5                | 34.2               | 8.06 | 51                       |

Table 15. Distributional and environmental records for Ceratium setaceum

| Station  | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m3 |
|----------|------------|-----------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------|
| 70<br>70 | 434<br>435 | 0<br>50   | r                  | p              | 1/13/29<br>1/13/29 | 21.2<br>15.4        | 35.1<br>35.0       | 8.05<br>7.88 | 103<br>178   |
| 110      | 666        | 100       | oc                 | p              | 5/31/29            | 17.9                | 34.7               | 8.14         | 11           |

Table 16. Distributional and environmental records for Ceratium bigelowii

| Station | Sample      | Depth | Relative  | Appa- | Date     | Temperature | Salinity | pН   | PO <sub>4</sub>  |
|---------|-------------|-------|-----------|-------|----------|-------------|----------|------|------------------|
|         |             | (m)   | abundance | ratus |          | (°C)        | (0/00)   |      | mg/m3            |
|         |             |       |           |       |          |             |          |      |                  |
| 45      | 257         | 50    | r         | n     | 11/19/28 | 22.4        | 35.2     | 8.13 | 46               |
| 47      | 267         | 50    | r         | n     | 11/23/28 | 23.8        | 36.0     | 8.23 | 20               |
| 47      | 268         | 100   | r         | n     | 11/23/28 | 22.7        | 36.2     | 8.23 | 20               |
| 48      | 272         | 50    | r         | n     | 11/25/28 | 23.6        | 36.4     | 8.24 | 16               |
| 49      | 278         | 50    | r         | n     | 11/27/28 | 22.6        | 36.1     | 8.26 | 13               |
| 54      | 321         | 100   | r         | n     | 12/14/28 | 18.7        | 35.4     | 8.16 | 20               |
| 56      | 330         | 100   | r         | n     | 12/18/28 | 16.6        | 34.8     | 8.11 | 12               |
| 57      | 337         | 100   | r         | n     | 12/20/28 | 14.3        | 34.4     | 8.10 | 40               |
| 78      | 477         | 100   | r         | n     | 2/20/29  | 21.9        | 36.2     | 8.14 | 34               |
| 78      | 478         | 0     | r         | p     | 2/20/29  | 24.6        | 36.0     | 8.17 | 32               |
| 81      | 492         | 50    | r         | n     | 2/26/29  | 26.4        | 35.9     | 8.19 | 38               |
| 89      | <b>52</b> 9 | 50    | r         | n     | 3/23/29  | 28.6        | 35.8     | 8.27 | 12               |
| 89      | 530         | 0     | r         | p     | 3/23/29  | 28.4        | 35.6     | 8.25 | 21               |
| 89      | 532         | 0     | r         | n     | 3/23/29  | (28.4       | 35.6     | 8.25 | 21)              |
| 95      | 563         | 50    | oc        | n     | 4/24/29  | 29.3        | 34.9     | 8.24 | 16               |
| 95      | 564         | 100   | r         | n     | 4/24/29  | 28.5        | 35.4     | 8.22 | 21               |
| 95      | 567         | 100   | Γ         | p     | 4/24/29  | 28.5        | 35.4     | 8.22 | 21               |
| 96      | 568         | 0     | r         | n     | 4/26/29  | 29.3        | 35.3     | 8.23 | 12               |
| 96      | 569         | 50    | oc        | n     | 4/26/29  | 29.2        | 35.3     | 8.23 | 12               |
| 96      | 570         | 100   | r         | n     | 4/26/29  | 28.2        | 35.7     | 8.19 | 25               |
| 100     | 596         | 50    | r         | n     | 5/ 4/29  | 27.6        | 34.7     | 8.21 | 10               |
| 100     | 597         | 100   | r         | n     | 5/ 4/29  | 27.6        | 34.7     | 8.22 | 12               |
| 103     | 615         | 0     | r         | n     | 5/11/29  | 26.0        | 35.0     | 8.25 | 5                |
| 105     | 627         | 50    | r         | n     | 5/15/29  | 26.8        | 34.9     | 8.23 | 5                |
| 106     | 634         | 50    | r         | n     | 5/17/29  | 27.0        | 35.0     | 8.23 | 5<br>5<br>5<br>5 |
| 107     | 639         | 0     | r         | n     | 5/19/29  | 28.0        | 34.4     | 8.23 | 5                |
| 107     | 641         | 100   | r         | n     | 5/19/29  | 26.8        | 34.9     | 8.23 | 11               |
| 108     | 648         | 100   | Г         | n     | 5/27/29  | 25.2        | 35.0     | 8.23 | 4                |
| 109     | 655         | 50    | r         | n     | 5/29/29  | 23.1        | 35.0     | 8.22 | 4<br>3<br>3      |
| 136     | 829         | 100   | r         | n     | 9/16/29  | 18.6        | 35.0     | 8.39 | 3                |

Table 16. Distributional and environmental records for Ceratium bigelowii--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 154     | 958    | 0         | r                  | n              | 10/31/29 | 28.3                | 34.2               | 8.39 | 7                                    |
| 154     | 959    | 50        | r                  | n              | 10/31/29 | 28.2                | 34.2               | 8.40 | 7                                    |
| 155     | 965    | 0         | r                  | n              | 11/ 2/29 | 27.8                | 34.9               | 8.29 | 29                                   |
| 155     | 966    | 50        | r                  | n              | 11/ 2/29 | 27.7                | 34.9               | 8.30 | 30                                   |
| 155     | 967    | 100       | r                  | n              | 11/ 2/29 | 27.2                | 35.0               | 8.30 | 35                                   |
| 158     | 983    | 0         | r                  | n              | 11/ 8/29 | 28.2                | 35.6               | 8.34 | 36                                   |
| 158     | 984    | 50        | r                  | n              | 11/ 8/29 | 28.2                | 35.6               | 8.39 | 50                                   |
| 159     | 990    | 0         | oc                 | n              | 11/11/29 | 28.6                | 35.7               | 8.37 | 15                                   |
| 159     | 991    | 50        | oc                 | n              | 11/11/29 | 28.5                | 35.7               | 8.39 | 15                                   |
| 159     | 992    | 100       | r                  | n              | 11/11/29 | 28.0                | 35.7               | 8.37 | 23                                   |

Table 17. Distributional and environmental records for Ceratium inflatum

|         |        | Depth | Relative     | Anno           | T        | Temperature | Salinity |      | DO.           |
|---------|--------|-------|--------------|----------------|----------|-------------|----------|------|---------------|
| Station | Sample |       | abundance    | Appa-<br>ratus | Date     |             |          | pН   | PO4           |
|         |        | (m)   | abuildance   | ratus          | L        | (°C)        | (0/00)   |      | mg/m          |
| 17      | 112    | 50    | _            | _              | 8/15/28  | 21.9        | 36.6     | 8.28 | 4.0           |
| 18      | 118    | 50    | r            | n<br>n         | 8/17/28  | 22.4        | 36.8     | 8.24 | 12<br>5       |
| 20-21   | 131    | 0     | r            | n              | 8/24/28  | (26.6       | 36.3     | 8.32 | 4)            |
| 24      | 151    | 0     | r            |                | 8/31/28  | 27.2        | 35.2     | 8.32 | 4             |
| 37      | 218    | 50    | r            | p<br>n         | 11/ 1/28 | 18.8        | 34.5     | 8.00 | 121           |
| 53      | 304    | 50    | r            | n              | 12/15/28 | 21.2        | 35.8     | 8.20 | 13            |
| 54      | 320    | 50    | r            | n              | 12/14/28 | 19.8        | 35.4     | 8.18 | 17            |
| 56      | 330    | 100   | r            | n              | 12/18/28 | 16.6        | 34.8     | 8.11 | 12            |
| 90      | 533    | 0     | r            | n              | 3/25/29  | 28.5        | 35.5     | 8.27 | 21            |
| 99      | 589    | ő     | r            | n              | 5/ 2/29  | 27.9        | 34.9     | 8.21 | 12            |
| 99      | 590    | 50    | oc           | n              | 5/ 2/29  | 27.8        | 34.9     | 8.22 | 12            |
| 99      | 595    | 0     | r            | n              | 5/ 2/29  | 27.9        | 34.9     | 8.21 | 12            |
| 100     | 597    | 100   | r            | n              | 5/ 4/29  | 27.6        | 34.7     | 8.22 | 12            |
| 101     | 603    | 0     | r            | n              | 5/ 7/29  | 26.3        | 34.7     | 8.24 | 8             |
| 101     | 605    | 100   | r            | n              | 5/ 7/29  | 25.2        | 35.1     | 8.23 | 8             |
| 104     | 621    | 0     | r            | n              | 5/13/29  | 25.8        | 35.2     | 8.24 | 7             |
| 104     | 625    | 50    | r            | р              | 5/13/29  | 25.8        | 35.2     | 8.24 | 7             |
| 105     | 627    | 50    | r            | 'n             | 5/15/29  | 26.8        | 34.9     | 8.23 | 5             |
| 105     | 629    | 100   | r            | n              | 5/15/29  | 25.2        | 35.1     | 8.23 | 5             |
| 106     | 633    | 0     | $\mathbf{r}$ | n              | 5/17/29  | 27.2        | 35.0     | 8.23 | 5             |
| 106     | 634    | 50    | r            | n              | 5/17/29  | 27.0        | 35.0     | 8.23 | 5             |
| 106     | 635    | 100   | r            | n              | 5/17/29  | 25.6        | 35.1     | 8.23 | 8877555555557 |
| 107     | 642    | 0     | r            | p              | 5/19/29  | 28.0        | 34.4     | 8.23 | 5             |
| 111     | 672    | 50    | r            | p              | 6/ 3/29  | 19.4        | 34.6     | 8.17 | 5             |
| 138     | 845    | 100   | r            | n              | 9/20/29  | 22.2        | 34.8     | 8.31 | 3             |
| 142     | 874    | 100   | r            | n              | 10/ 8/29 | 16.6        | 34.4     | 8.27 |               |
| 145     | 890    | 0     | r            | n              | 10/13/29 | 22.3        | 34.6     | 8.29 | 6             |
| 145     | 894    | 50    | r            | p              | 10/13/29 | 18.7        | 34.3     | 8.34 | 6             |
| 151     | 942    | 50    | r            | p              | 10/26/29 | 18.3        | 34.4     |      |               |
| 158     | 983    | 0     | r            | n              | 11/ 8/29 | 28.2        | 35.6     | 8.34 | 36            |
| 159     | 990    | 0     | r            | n              | 11/11/29 | 28.6        | 35.7     | 8.37 | 15            |

Table 18. Distributional and environmental records for Ceratium longirostrum

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------|
| 1b      | 8      | 100       | r                  | n              | 5/18/28  | (20.3               | 36.5               | 8.18 | 36)                      |
| 20      | 128    | 0         | r                  | n              | 8/22/28  | 26.0                | 36.6               | 8.37 | 5                        |
| 49      | 277    | 0         | r                  | n              | 11/27/28 | 23.4                | 36.2               | 8.27 | 13                       |
| 49      | 279    | 100       | r                  | n              | 11/27/28 | 21.6                | 35.9               | 8.26 | 13                       |
| 49      | 282    | 100       | r                  | р              | 11/27/28 | 21.6                | 35.9               | 8.26 | 13                       |
| 49a     | 283    | 0         | r                  | n              | 11/29/28 | (23.2               | 36.0               | 8.23 | 13)                      |
| 78      | 479    | 50        | r                  | р              | 2/20/29  | 23.8                | 36.1               | 8.14 | 32                       |
| 84      | 505    | 0         | r                  | n              | 3/4/29   | 27.8                | 36.2               | 8.23 | 24                       |
| 93      | 551    | 50        | oc                 | ° n            | 3/31/29  | 28.5                | 34.8               | 8.30 | 28                       |
| 93      | 553    | 100       | r                  | р              | 3/31/29  | 27.6                | 35.8               | 8.27 | 29                       |
| 96      | 570    | 100       | r                  | n              | 4/26/29  | 28.2                | 35.7               | 8.19 | 25                       |
| 96      | 573    | 100       | r                  | p              | 4/26/29  | 28.2                | 35.7               | 8.19 | 25                       |
| 98      | 585    | 50        | X.                 | p              | 4/30/29  | 26.9                | 35.3               | 8.16 | 28                       |
| 101     | 605    | 100       | oc                 | n              | 5/ 7/29  | 25.2                | 35.1               | 8.23 | 8                        |
| 102     | 609    | 0         | oc                 | n              | 5/ 9/29  | 25.8                | 35.0               | 8.24 | 8<br>8<br>5              |
| 102     | 610    | 50        | oc                 | n              | 5/ 9/29  | 25.8                | 35.0               | 8.24 | 8                        |
| 103     | 615    | 0         | oc                 | n              | 5/11/29  | 26.0                | 35.0               | 8.25 | 5                        |

Table 18. Distributional and environmental records for Ceratium longirostrum--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | рН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 103     | 616    | 50        | r                  | n              | 5/11/29  | 25.8                | 35.2               | 8.25 | 5                                    |
| 103     | 617    | 100       | r                  | n              | 5/11/29  | 24.8                | 35.2               | 8.25 | 5                                    |
| 103     | 618    | 0         | r                  | p              | 5/11/29  | 26.0                | 35.0               | 8.25 | 5                                    |
| 104     | 621    | 0         | r                  | 'n             | 5/13/29  | 26.1                | 35.2               | 8.24 | 7                                    |
| 106     | 635    | 100       | r                  | n              | 5/17/29  | 25.6                | 35.1               | 8.23 | 5                                    |
| 107     | 639    | 0         | r                  | n              | 5/19/29  | 28.0                | 34.4               | 8.23 | 5                                    |
| 107     | 642    | 0         | r                  | р              | 5/19/29  | 28.0                | 34.4               | 8.23 | 5                                    |
| 145     | 890    | 0         | r                  | n              | 10/13/29 | 22.3                | 34.6               | 8.29 | 6                                    |
| 145     | 893    | 0         | r                  | p              | 10/13/29 | 22.3                | 34.6               | 8.29 | 6                                    |

Table 19. Distributional and environmental records for Ceratium falcatum

| Station    | Sample     | Depth (m) | Relative<br>abundance | Appa-<br>ratus |                      | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|------------|-----------|-----------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 15         | 102        | 100       | r                     | n              | 8/11/28              | 18.4                | 36.4               | 8.20         | 19                                   |
| 50         | 286        | 100       | r                     | n              | 11/29/28             | 20.5                | 35.7               | 8.22         | 13                                   |
| 50a<br>51  | 291<br>293 | 0         | r                     | n              | 12/ 1/28             | 22.8                | 35.6               | 8.22         | 16                                   |
| 51         | 293<br>294 | 50        | r                     | n<br>n         | 12/ 1/28<br>12/ 1/28 | 22.8<br>20.5        | 35.6<br>35.6       | 8.22<br>8.22 | 16<br>17                             |
| 51         | 295        | 100       | r                     | n              | 12/ 1/28             | 20.0                | 35.6               | 8.22         | 17                                   |
| 51         | 296        | 0         | r                     | p              | 12/ 1/28             | 22.8                | 35.6               | 8.22         | 16                                   |
| 52         | 299        | 0         | г                     | 'n             | 12/ 3/28             | 22.8                | 35.6               | 8.22         | 16                                   |
| 52         | 301        | 100       | r                     | n              | 12/ 3/28             | 18.2                | 35.2               | 8.17         | 8                                    |
| 53         | 304        | 50        | r                     | n              | 12/ 5/28             | 21.2                | 35.8               | 8.20         | 13                                   |
| 53-54      | 310        | 0         | r                     | n              | 12/14/28             | (23.0               | 35.6               | 8.22         | 11)                                  |
| 55<br>55   | 323        | 0         | r                     | n              | 12/16/28             | 20.4                | 34.9               | 8.19         | 12                                   |
| 56         | 324<br>330 | 50<br>100 | r                     | n              | 12/16/28<br>12/18/28 | 18.7<br>16.6        | 35.0<br>34.8       | 8.18<br>8.11 | 12<br>12                             |
| 56         | 331        | 0         | r                     | n<br>p         | 12/18/28             | 20.8                | 34.9               | 8.13         | 9                                    |
| 56-57      | 334        | ŏ         | r                     | n              | 12/20/28             | (19.0               | 34.5               | 8.14         | 20)                                  |
| 69         | 425        | 50        | r                     | n              | 1/12/29              | 17.4                | 35.1               | 7.99         | 151                                  |
| 69         | 426        | 100       | г                     | n              | 1/12/29              | 14.6                | 34.8               | 7.86         | 198                                  |
| 71         | 441        | 0         | r                     | р              | 2/ 6/29              | 23.5                | 35.2               | 8.13         | 58                                   |
| 74         | 459        | 0         | r                     | р              | 2/12/29              | 24.2                | 35.6               | 8.17         | 68                                   |
| 76         | 467        | 0         | r                     | n              | 2/16/29              | 23.4                | 35.9               | 8.15         | 50                                   |
| 80         | 488<br>493 | 0         | r                     | p              | 2/24/29              | 26.0<br>26.5        | 35.9<br>35.8       | 8.20         | 36                                   |
| 81<br>82   | 498        | 0         | r                     | þ              | 2/26/29<br>2/28/29   | 27.2                | 36.3               | 8.19<br>8.21 | 38<br>34                             |
| 86         | 516        | ő         | r                     | p<br>n         | 3/ 9/29              | 28.3                | 36.2               | 8.29         | 20                                   |
| 86         | 518        | ŏ         | r                     | p              | 3/ 9/29              | 28.3                | 36.2               | 8.29         | 20                                   |
| 87         | 521        | Ŏ         | r                     | 'n             | 3/11/29              | 27.8                | 36.1               | 8.28         | 17                                   |
| 87         | 522        | 50        | r                     | n              | 3/11/29              | 26.5                | 36.1               | 8.26         | 20                                   |
| 87         | 523        | 0         | r                     | p              | 3/11/29              | 27.8                | 36.1               | 8.28         | 17                                   |
| 88         | 526        | 0         | r                     | n              | 3/21/29              | 28.5                | 35.9               | 8.23         | 16                                   |
| 89         | 532        | 0         | r                     | n              | 3/23/29              | (28.4               | 35.6               | 8.25         | 21)                                  |
| 90<br>90   | 533<br>535 | 0         | r                     | n              | 3/25/29<br>3/25/29   | 28.5<br>28.5        | 35.5<br>35.5       | 8.27<br>8.27 | 21<br>21                             |
| 102        | 609        | ő         | oc                    | p<br>n         | 5/ 9/29              | 25.8                | 35.0               | 8.24         | 8                                    |
| 108        | 697        | 50        | r                     | n              | 5/27/29              | 26.8                | 35.0               | 8.24         | 4                                    |
| 109        | 656        | 100       | r                     | n              | 5/29/29              | 19.4                | 34.8               | 8.18         | 5                                    |
| 110        | 664        | 0         | r                     | p              | 5/31/29              | 23.9                | 34.7               | 8.18         | 5                                    |
| 138        | 843        | 0         | r                     | 'n             | 9/20/29              | 26.1                | 34.8               | 8.35         | 5<br>5<br>5<br>3                     |
| 138        | 844        | 50        | r                     | p              | 9/20/29              | 25.6                | 34.7               | 8.30         | 3                                    |
| 139        | 850        | 50        | r                     | n              | 9/22/29              | 25.8                | 34.9               | 8.31         | 6                                    |
| 140        | 858<br>920 | 100       | r                     | n              | 10/3/29              | 25.5<br>23.5        | 35.0<br>35.0       | 8.34         | 7                                    |
| 149<br>149 | 927        | 0         | r                     | n              | 10/21/29<br>10/21/29 | 23.5                | 35.0               | 8.34<br>8.34 | 6<br>6                               |
| 150        | 930        | 50        | r                     | p<br>n         | 10/21/29             | 22.8                | 34.8               | 8.35         | 10                                   |
| 150        | 931        | 100       | r                     | n              | 10/23/29             | 19.6                | 34.6               | 8.32         | 11                                   |
| 152        | 945        | 50        | r                     | n              | 10/27/29             | 14.2                | 34.5               | 7.87         | 53                                   |
| 158        | 985        | 100       | $\mathbf{r}$          | n              | 10/27/29             | 27.6                | 35.9               | 8.39         | 48                                   |

Table 20. Distributional and environmental records for Ceratium extensum

| Station        | Sample      | Depth     | Relative  | Appa-  | Date                 | Temperature    | Salinity     | рН           | PO <sub>4</sub>   |
|----------------|-------------|-----------|-----------|--------|----------------------|----------------|--------------|--------------|-------------------|
|                |             | (m)       | abundance | ratus  |                      | (°C)           | (0/00)       | Pas          | mg/m <sup>3</sup> |
| 1              | 1           | 0         |           | _      | E /19 /90            | 24.0           | 36.2         | 0.10         | 0.4               |
| 1a             | 5           | ő         | r         | n<br>n | 5/12/28<br>5/18/28   | 24.0<br>(22.3  | 36.3         | 8.16<br>8.20 | 34<br>46)         |
| 1b             | 6           | ő         | oc        | n      | 5/18/28              | (22.3          | 36.3         | 8.20         | 46)               |
| 1b             | 7           | 50        | oc        | n      | 5/18/28              | (22.3          | 36.3         | 8.20         | 46)               |
| 2              | 13          | 100       | oc        | n      | 5/18/28              | 19.8           | 36.4         | 8.21         | 33                |
| 2<br>3<br>3    | 14          | 0         | r         | n      | 5/18/28              | 20.5           | 36.4         | 8.23         | 58                |
| 3              | 17<br>18    | 0<br>50   | C         | n      | 5/21/28              | 15.5           | 36.1<br>36.0 | 8.15<br>8.19 | 99                |
| 6b             | 44          | 0         | oc<br>c   | n<br>n | 5/21/28<br>5/31/28   | 15.0<br>(12.4  | 35.6         | 8.15         | 30<br>21)         |
| 6b             | 45          | 0         | oc        | n      | 5/31/28              | (12.4          | 35.6         | 8.15         | 21)               |
| 6b             | 46          | 0         | ос        | n      | 5/31/28              | (12.4          | 35.6         | 8.15         | 21)               |
| 6c             | 48          | 0         | oc        | n      | 5/31/28              | (12.4          | 35.6         | 8.15         | 21)               |
| 6c<br>16       | 49<br>103   | 0         | c<br>r    | n      | 5/31/28<br>8/13/28   | (12.4<br>25.9  | 35.6<br>36.2 | 8.15         | 21)               |
| 16             | 105         | 100       | r         | p<br>p | 8/13/28              | 19.9           | 36.5         | 8.24<br>8.17 | 8<br>13           |
| 16             | 106         | 0         | r         | n      | 8/13/28              | 25.9           | 36.2         | 8.24         | 8                 |
| 16             | 107         | 50        | r         | n      | 8/13/28              | 24.4           | 36.4         | 8.23         | 8                 |
| 17             | 109         | 0         | r         | p      | 8/15/28              | 26.2           | 36.6         | 8.29         | 9                 |
| 18             | 114         | 0         | r         | p      | 8/17/28              | 27.0           | 37.0         | 8.23         | 5                 |
| 19<br>31       | 123<br>193  | 50<br>100 | r         | n<br>n | 8/20/28<br>10/ 3/28  | 25.2<br>23.4   | 37.1<br>36.5 | 8.27<br>8.19 | 5<br>28           |
| 33             | 197A        | 0         | r         | p      | 10/ 8/28             | 28.5           | 35.6         | 8.23         | 4                 |
| 34             | 200A        | ŏ         | oc        | p      | 10/ 9/28             | 28.5           | 35.9         | 8.28         | 2                 |
| 35-36          | 209         | 0         | oc        | n      | 10/26/28             | (27.4          | 29.7         | 8.31         | 15)               |
| 45             | 256         | 0         | r         | n      | 11/19/28             | 22.4           | 35.3         | 8.12         | 38                |
| 45<br>45       | 257<br>258  | 50<br>100 | r         | n<br>n | 11/19/28<br>11/19/28 | 22.4<br>18.6   | 35.2<br>35.1 | 8.13<br>8.00 | 46<br>50          |
| 45             | 259         | 0         | r         | p      | 11/19/28             | 22.4           | 35.3         | 8.12         | 38                |
| 46             | 261         | 0         | oc        | 'n     | 11/21/28             | 23.3           | 35.3         | 8.16         | 36                |
| 46             | 262         | 50        | r         | n      | 11/21/28             | 23.2           | 35.3         | 8.16         | 40                |
| 46<br>46       | 263<br>264  | 100       | r         | n      | 11/21/28<br>11/21/28 | 22.5<br>23.3   | 35.4<br>35.3 | 8.17<br>8.16 | 40                |
| 46             | 265         | 50        | oc<br>oc  | p<br>p | 11/21/28             | 23.2           | 35.3         | 8.16         | 36<br>40          |
| 47             | 266         | 0         | r         | n      | 11/23/28             | 23.9           | 36.0         | 8.23         | 17                |
| 47             | 267         | 50        | oc        | n      | 11/23/28             | 23.8           | 36.0         | 8.23         | 20                |
| 47<br>47       | 268<br>269  | 100       | oc        | n      | 11/23/28<br>11/23/28 | 22.7           | 36.2         | 8.23         | 20                |
| 47             | 270         | 50        | oc        | p<br>p | 11/23/28             | 23.9<br>23.8   | 36.0<br>36.0 | 8.23<br>8.23 | 17<br>20          |
| 48             | 272         | 50        | r         | n      | 11/25/28             | 23.6           | 36.4         | 8.24         | 16                |
| 48             | 273         | 100       | oc        | n      | 11/25/28             | 22.7           | 36.3         | 8.26         | 16                |
| 48             | 274<br>277  | 0         | r         | p      | 11/25/28             | 23.6           | 36.4         | 8.23         | 13                |
| 49<br>49       | 279         | 100       | oc<br>oc  | n<br>n | 11/27/28<br>11/27/28 | 23.4<br>21.6   | 36.2<br>35.9 | 8.27<br>8.26 | 13<br>13          |
| 49             | 280         | 0         | r         | p      | 11/27/28             | 23.4           | 36.2         | 8.27         | 13                |
| 49             | 281         | 50        | r         | p      | 11/27/28             | 22.6           | 36.1         | 8.26         | 13                |
| 49a            | 283         | 0         | oc        | n      | 11/28/28             | (23.2          | 36.0         | 8.23         | 13)               |
| 50<br>50       | 284<br>286  | 0<br>100  | oc<br>oc  | n<br>n | 11/29/28<br>11/29/28 | 23.2<br>20.5   | 36.0<br>35.7 | 8.23<br>8.22 | 13<br>13          |
| 50-51          | 290         | 0         | r         | n      | 11/30/28             | (22.8          | 35.6         | 8.22         | 16)               |
| 50-51          | 291         | 0         | ос        | n      | 11/30/28             | (22.8          | 35.6         | 8.22         | 16)               |
| 50-51          | 292         | 0         | oc        | n      | 11/30/28             | (22.8          | 35.6         | 8.22         | 16)               |
| 51<br>51       | 293<br>294  | 0<br>50   | oc        | n      | 12/ 1/28<br>12/ 1/28 | (22.8<br>20.5  | 35.6<br>35.6 | 8.22<br>8.22 | 16)<br>17         |
| 51             | 295         | 100       | r         | n<br>n | 12/ 1/28             | 20.0           | 35.6         | 8.22         | 17                |
| 51             | 296         | 0         | oc        | р      | 12/ 1/28             | 22.8           | 35.6         | 8.22         | 16                |
| 52             | 299         | 0         | r         | n      | 12/ 3/28             | 22.5           | 35.4         | 8.21         | 8                 |
| 53-54<br>53-54 | 310<br>311  | 0         | r         | n      | 12/10/28<br>12/10/28 | (23.0<br>(23.0 | 35.6<br>35.6 | 8.22<br>8.22 | 11)               |
| 53-54          | 312         | ő         | oc        | n<br>n | 12/10/28             | (23.0          | 35.6         | 8.22         | 11)<br>11)        |
| 54             | 319         | 0         | r         | n      | 12/14/28             | 23.4           | 35.5         | 8.22         | 9                 |
| 54             | 320         | 50        | oc        | n      | 12/14/28             | 19.8           | 35.4         | 8.18         | 17                |
| 54<br>55       | 322<br>323  | 0         | r         | p<br>n | 12/14/28<br>12/16/28 | 23.4<br>20.4   | 35.5<br>34.9 | 8.22<br>8.19 | 9<br>12           |
| 56             | 330         | 100       | r         | n      | 12/18/28             | 16.6           | 34.8         | 8.11         | 12                |
| 56             | 333         | 100       | r         | p      | 12/18/28             | 16.6           | 34.8         | 8.11         | 12                |
| 57             | 335         | 0         | OE        | n      | 12/20/28             | 19.0           | 34.5         | 8.14         | 20                |
| 59<br>60       | 351<br>355  | 0<br>50   | r         |        | 12/24/28             | 16.3<br>13.4   | 34.0<br>34.0 | 8.10         | 38<br>54          |
| 60             | 356         | 100       | r         | n<br>n | 12/26/28<br>12/26/28 | 10.6           | 34.0         | 8.06<br>8.03 | 62                |
| 61             | 368         | 100       | r         | p      | 12/28/28             | 10.8           | 34.0         | 8.03         | 80                |
| 61-62          | <b>3</b> 69 | 0         | r         | n      | 12/28/28             | (16.9          | 34.0         | 8.05         | 46)               |
| 61-62<br>63    | 370         | 100       | r         | n      | 12/28/28             | (16.9<br>15.6  | 34.0<br>34.6 | 8.05<br>8.08 | 46)<br>24         |
| 63-64          | 381<br>386  | 0         | r         | n<br>n | 1/ 1/29<br>1/ 1/29   | (20.5          | 34.6         | 8.07         | 21)               |
| 63-64          | 387         | 0         | r         | n      | 1/ 2/29              | (20.5          | 34.6         | 8.07         | 21)               |
| 63-64          | 388         | 0         | r         | n      | 1/ 2/29              | (20.5          | 34.6         | 8.07         | 21)               |

Table 20. Distributional and environmental records for Ceratium extensum -- Continued

|                |            | l D . 12  | D-1-41             | T A ::         |                    | m                   | 0-11-11            |              |              |
|----------------|------------|-----------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------|
| Station        | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m3 |
|                | 200        |           |                    |                | 1 / 0 / 20         |                     | 24.0               | 0.05         |              |
| 63-64          | 389<br>390 | 0         | r                  | n              | 1/ 2/29<br>1/ 2/29 | (20.5               | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)   |
| 63-64<br>63-64 | 391        | ő         | r                  | n<br>n         | 1/ 3/29            | (20.5<br>(20.5      | 34.6               | 8.07         | 21)          |
| 63-64          | 392        | ő         | r                  | n              | 1/ 3/29            | (20.5               | 34.6               | 8.07         | 21           |
| 63-64          | 393        | ő         | r                  | n              | 1/ 3/29            | (20.5               | 34.6               | 8.07         | 21)          |
| 64             | 394        | 0         | r                  | n              | 1/ 3/29            | 20.6                | 34.6               | 8.12         | 21           |
| 64             | 398        | 0         | r                  | р              | 1/ 3/29            | 20.6                | 34.6               | 8.12         | 21           |
| 64-65          | 402        | 0         | r                  | n              | 1/ 4/29            | (20.6               | 34.6               | 8.12         | 21)          |
| 65             | 408        | 0         | r                  | p              | 1/ 5/29            | 20.2                | 34.5               | 8.10         | 24           |
| 67<br>68       | 416<br>422 | 0         | oc                 | n              | 1/ 8/29<br>1/10/29 | 19.3<br>19.2        | 34.9<br>35.1       | 8.11<br>8.14 | 21<br>29     |
| 76             | 468        | 50        | r                  | p<br>n         | 2/16/29            | 22.1                | 35.9               | 8.14         | 42           |
| 76             | 469        | 100       | r                  | n              | 2/16/29            | 21.2                | 35.8               | 8.12         | 45           |
| 77             | 472        | 0         | r                  | n              | 2/18/29            | 23.7                | 36.0               | 8.19         | 16           |
| 78             | 476        | 50        | r                  | n              | 2/20/29            | 23.8                | 36.1               | 8.14         | 32           |
| 78             | 477        | 100       | oc                 | n              | 2/20/29            | 21.9                | 36.2               | 8.14         | 34           |
| 78             | 478        | 0         | r                  | p              | 2/20/29            | 24.6                | 36.0               | 8.17         | 32           |
| 78             | 479        | 50        | r                  | p              | 2/20/29            | 23.8                | 36.1<br>36.2       | 8.14<br>8.14 | 32<br>34     |
| 78<br>79       | 480<br>481 | 100       | r<br>oc            | p<br>n         | 2/20/29<br>2/22/29 | 21.9<br>25.2        | 36.0               | 8.17         | 34           |
| 79             | 482        | 50        | oc                 | n              | 2/22/29            | 24.5                | 36.1               | 8.17         | 34           |
| 79             | 483        | 100       | r                  | n              | 2/22/29            | 21.8                | 36.2               | 8.13         | 45           |
| 79             | 484        | 0         | r                  | p              | 2/22/29            | 25.2                | 36.0               | 8.17         | 34           |
| 80             | 486        | 0         | r                  | n              | 2/24/29            | 26.0                | 35.9               | 8.20         | 36           |
| 80             | 488        | 0         | r                  | p              | 2/24/29            | 26.0                | 35.9               | 8.20         | 36           |
| 80             | 489        | 50        | oc                 | p              | 2/24/29            | 25.9                | 36.0<br>36.2       | 8.19<br>8.16 | 29<br>32     |
| 80<br>81       | 490<br>491 | 100       | r                  | p<br>n         | 2/24/29<br>2/26/29 | 23.4<br>26.5        | 35.8               | 8.19         | 38           |
| 81             | 492        | 50        | c                  | n              | 2/26/29            | 26.4                | 35.9               | 8.19         | 38           |
| 81             | 493        | 0         | oc                 | p              | 2/26/29            | 26.5                | 35.8               | 8.19         | 38           |
| 81             | 494        | 50        | oc                 | p              | 2/26/29            | 26.4                | 35.9               | 8.19         | 38           |
| 81             | 495        | 100       | r                  | p              | 2/26/29            | 23.6                | 36.2               | 8.18         | 36           |
| 82             | 496        | 0         | oc                 | n              | 2/28/29            | 27.2                | 36.3               | 8.21         | 34           |
| 82             | 497        | 50        | oc                 | n              | 2/28/29            | 27.2                | 36.3               | 8.21         | 34           |
| 82<br>83       | 498<br>501 | 0         | oc                 | p<br>n         | 2/28/29<br>3/ 2/29 | 27.2<br>27.5        | 36.3<br>36.3       | 8.21<br>8.24 | 34<br>29     |
| 83             | 502        | 50        | c<br>r             | n              | 3/ 2/29            | 27.4                | 36.5               | 8.24         | 25           |
| 83             | 504        | 50        | r                  | p              | 3/ 2/29<br>3/ 2/29 | 27.4                | 36.5               | 8.24         | 25           |
| 84             | 505        | 0         | ос                 | 'n             | 3/ 4/29            | 27.8                | 36.2               | 8.23         | 24           |
| 84             | 506        | 50        | oc                 | n              | 3/4/29             | 27.5                | 36.4               | 8.21         | 24           |
| 85             | 510        | 0         | oc                 | n              | 3/ 6/29            | 27.9                | 36.2               | 8.22         | 40           |
| 85             | 511        | 50        | r                  | n              | 3/ 6/29            | 27.8                | 36.2               | 8.22         | 40           |
| 85<br>86       | 512<br>516 | 0         | r                  | p              | 3/ 6/29<br>3/ 9/29 | 27.9<br>28.3        | 36.2<br>36.2       | 8.22<br>8.29 | 40<br>20     |
| 86             | 517        | 50        | oc<br>oc           | n<br>n         | 3/ 9/29            | 27.4                | 36.2               | 8.29         | 17           |
| 86             | 518        | 0         | r                  | p              | 3/ 9/29            | 28.3                | 36.2               | 8.29         | 20           |
| 87             | 521        | 0         | oc                 | n              | 3/11/29            | 27.8                | 36.1               | 8.28         | 17           |
| 87             | 523        | 0         | r                  | p              | 3/11/29            | 27.8                | 36.1               | 8.28         | 17           |
| 87             | 525        | 100       | r                  | p              | 3/11/29            | 23.9                | 36.0               | 8.23         | 20           |
| 88             | 526        | 0         | oc                 | n              | 3/21/29            | 28.5                | 35.9               | 8.23<br>8.25 | 16           |
| 89<br>89       | 528<br>529 | 0<br>50   | 00                 | n              | 3/23/29<br>3/23/29 | 28.4<br>28.6        | 35.6<br>35.8       | 8.25         | 21<br>12     |
| 89             | 530        | 0         | oc<br>r            | n<br>p         | 3/23/29            | 28.4                | 35.6               | 8.25         | 21           |
| 89             | 532        | ŏ         | r                  | n              | 3/23/29            | (28.4               | 35.6               | 8.25         | 21)          |
| 90             | 533        | 0         | c                  | n              | 3/25/29            | 28.5                | 35.5               | 8.27         | 21           |
| 90             | 535        | 0         | oc                 | p              | 3/25/29            | 28.5                | 35.5               | 8.27         | 21           |
| 90             | 536        | 50        | oc                 | p              | 3/25/29            | 28.6                | 35.6               | 8.26         | 21           |
| 91             | 540        | 0         | С                  | n              | 3/27/29            | 28.7                | 35.1<br>35.2       | 8.30<br>8.30 | 21           |
| 91<br>91       | 541<br>542 | 50<br>0   | c<br>oc            | n              | 3/27/29<br>3/27/29 | 28.5<br>28.7        | 35.2               | 8.30         | 24<br>21     |
| 91             | 543        | 50        | r                  | p<br>p         | 3/27/29            | 28.5                | 35.2               | 8.30         | 24           |
| 91             | 544        | 100       | r                  | p              | 3/27/29            | 25.8                | 36.0               | 8.25         | 30           |
| 92             | 545        | 0         | oc                 | n              | 3/29/29            | 28.5                | 35.3               | 8.29         | 28           |
| 92             | 546        | 50        | С                  | n              | 3/29/29            | 28.4                | 35.4               | 8.29         | 28           |
| 92             | 548        | 50        | r                  | p              | 3/29/29            | 28.4                | 35.4               | 8.29         | 28           |
| 93             | 551        | 50        | c                  | n              | 3/31/29            | 28.5                | 34.8               | 8.30         | 28           |
| 93             | 552        | 100       | r                  | p              | 3/31/29            | 28.7<br>27.6        | 34.7<br>35.8       | 8.30<br>8.27 | 28<br>29     |
| 93<br>94       | 553<br>558 | 100<br>50 | r                  | p<br>n         | 3/31/29 4/22/29    | 29.3                | 34.7               | 8.25         | 14           |
| 94             | 559        | 100       | r                  | n              | 4/22/29            | 28.5                | 35.6               | 8.21         | 25           |
| 94             | 561        | 50        | r                  | p              | 4/22/29            | 29.3                | 34.7               | 8.25         | 14           |
| 95             | 565        | ő         | r                  | p              | 4/24/29            | 29.4                | 34.7               | 8.26         | 14           |
| 95             | 568A       | Ö         | oc                 | n              | 4/25/29            | (29.4               | 34.7               | 8.26         | 14)          |
|                |            | 50        | oc                 | n              | 4/26/29            | 29.2                | 35.3               | 8.23         | 12           |
| 96             | 569        |           |                    |                |                    |                     |                    |              | 4.0          |
| 96<br>96<br>97 | 572<br>577 | 50        | r                  | p              | 4/26/29<br>4/28/29 | 29.2<br>28.3        | 35.3<br>35.2       | 8.23<br>8.16 | 12<br>24     |

Table 20. Distributional and environmental records for Ceratium extensum -- Continued

|                          | perature Salinity pH PO4 mg/m3   |
|--------------------------|--|
| 97 578 50 r p 4/28/29    | 28.0 35.4 8.16 21  |
| 98 584 0 r p 4/30/29     | 27.0 35.3 8.16 24<br>26.9 35.3 8.16 28   |
|                          | 26.9 35.3 8.16 28<br>27.8 35.0 8.22 17   |
| 99 595 0 r n 5/2/29      | 27.9 34.9 8.21 12  |
|                          | 27.6 34.7 8.21 10<br>27.6 34.7 8.22 12   |
|                          | 27.7 34.7 8.21 10  |
| 102 609 0 c n 5/9/29     | 25.8 35.0 8.24 8   |
|                          | 25.8 35.0 8.24 8<br>25.6 35.0 8.23 8   |
|                          | 25.8 35.0 8.24 8   |
| 102 613 50 r p 5/ 9/29   | 25.8 35.0 8.24 8   |
|                          | 26.0 35.0 8.25 5<br>25.8 35.2 8.25 5   |
|                          | 24.8 35.2 8.25 5   |
| 103 618 0 r p 5/11/29    | 26.0 35.0 8.25 5   |
|                          | 25.8 35.2 8.24 7<br>25.3 35.3 8.21 7   |
|                          | 26.8 34.9 8.23 5   |
| 105 628 50 c n 5/15/29   | 26.8 34.9 8.23 5   |
|                          | 26.9 34.9 8.23 5<br>26.8 34.9 8.23 5   |
| 106 633 0 c n 5/17/29    | 27.2 35.0 8.23 5   |
|                          | 27.0 35.0 8.23 5   |
|                          | 25.6 35.1 8.23 5<br>27.2 35.0 8.23 5   |
|                          | 27.0 35.0 8.23 5   |
| 107 639 0 c n 5/19/29    | 28.0 34.4 8.23 5   |
|                          | 27.9 34.4 8.23 4<br>26.8 34.9 8.23 11  |
|                          | 28.0 34.4 8.23 5   |
| 107 643 50 r p 5/19/29   | 27.9 34.4 8.23 4   |
| 100 000 0                | 27.9 34.4 8.23 4<br>28.4 35.0 8.25 4   |
| Guam 652 0 oc n 5/ /29   |  |
| 109 654 0 oc n 5/29/29   | 27.4 35.0 8.23 4   |
|                          | 23.1 35.0 8.22 3<br>23.1 35.0 8.22 3<br>23.9 34.7 8.18 5   |
| 110 664 0 oc p 5/31/29   | 23.9 34.7 8.18 5   |
|                          | 21.7 34.6 8.23 7<br>23.2 34.6 8.22 7   |
|                          | 23.2 34.6 8.22 7<br>16.4 33.0 8.12 29  |
| 129 780 0 r n 7/27/29    | 16.3 33.1 8.13 25  |
|                          | 16.2 33.4 8.34 36<br>19.3 33.4 8.34  |
|                          | 19.3 33.4 8.34<br>21.0 33.9 8.34 15  |
| 133 814 100 r p 9/10/29  | 18.4 34.8 8.31 7   |
|                          | 22.9 34.7 8.34 6<br>19.8 34.6 8.34 6   |
| 137 840 0 r p 9/18/29    | 25.5 35.0 8.39 4   |
| 140 862 100 r p 10/3/29  | 25.5 35.0 8.34 7   |
|                          | 25.9 35.2 8.34 5<br>25.9 35.2 8.34 5   |
| 142 872 0 r n 10/7/29    | 24.1 34.8 8.33 5   |
|                          | 21.8 34.8 8.30 5   |
|                          | 24.1 34.8 8.33 5<br>11.8 34.8 8.30 5<br>14.1 34.8 8.33 5<br>11.8 34.8 8.30 5                       |
| 142 879 100 r p 10/ 7/29 | 6.6 34.4 8.27 7  |
| 143 881 0 oc n 10/9/29   | 22.4 34.4 8.30 6<br>19.0 34.2 8.34 6   |
|                          | 19.0 34.2 8.34 6<br>13.8 34.1 8.30 10  |
| 143 884 0 r p 10/ 9/29   | 19.0 34.2 8.34 6   |
| 143 885 50 oc n 10/9/29  | 19.0 34.2 8.34 6<br>23.3 35.0 8.37 6   |
|                          | 33.3 35.0 6.37 6   |
| 144 888 50 r p 10/11/29  |  |
| 144 889 100 r p 10/11/29 | 21.1 34.7 8.33 6<br>16.6 34.5 8.37 6<br>22.3 34.6 8.29 6   |
|                          | 8.7 34.3 8.34 6  |
| 145 893 0 oc p 10/13/29  | 22.3 34.6 8.29 6   |
|                          | 18.7     34.3     8.34     6       19.7     34.3     8.26     7       22.4     34.9     8.37     6 |
|                          |  |
|                          | 9.7 34.3 8.26 7  |

Table 20. Distributional and environmental records for Ceratium extensum -- Concluded

| Station                                       | Sample                                 | Depth<br>(m)                             | Relative<br>abundance    | Appa-<br>ratus        | Date   | Temperature<br>(°C)                                  | Salinity<br>(0/00)                                   | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---|--|--|--------------------------|-----------------------|--|--|--|--|--------------------------------------|
| 152<br>152<br>158<br>158<br>158<br>159<br>159 | 946<br>949<br>983<br>984<br>985<br>991 | 100<br>50<br>0<br>50<br>100<br>50<br>100 | r<br>oc<br>oc<br>c<br>oc | n<br>p<br>n<br>n<br>n | 10/27/29<br>10/27/29<br>11/ 8/29<br>11/ 8/29<br>11/ 8/29<br>11/11/29<br>11/11/29 | 11.4<br>14.2<br>28.2<br>28.2<br>27.6<br>28.5<br>28.0 | 34.7<br>34.5<br>35.6<br>35.6<br>35.9<br>35.7<br>35.7 | 7.76<br>7.87<br>8.34<br>8.39<br>8.39<br>8.39<br>8.37 | 75<br>53<br>36<br>50<br>48<br>15     |

Table 21. Distributional and environmental records for Ceratium fusus

|             |            | 1            |                       |                |                    |                     |                    |              |                                      |
|-------------|------------|--------------|-----------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------------------------|
| Station     | Sample     | Depth<br>(m) | Relative<br>abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 3           | 19         | 100          | r                     | n              | 5/21/28            | 13.6                | 35.9               | 8.10         | 48                                   |
| 3           | 20         | 0            | c                     | n              | 5/21/28            | 15.5                | 36.1               | 8.15         | 99                                   |
| 3-4         | 21         | Ö            | r                     | n              | 5/23/28            | (15.1               | 36.0               | 8.15         | 96)                                  |
| 4           | 24         | 50           | $\mathbf{r}$          | n              | 5/23/28            | 14.4                | 36.0               | 8.15         | 21                                   |
| 4<br>5      | 25         | 0            | r                     | n              | 5/23/28            | 14.6                | 35.9               | 8.16         | 92                                   |
| 5           | 28<br>29   | 50           | oc                    | n              | 5/25/28            | 14.6                | 36.0               | 8.21         | 36                                   |
| 5a          | 33         | 0            | oc<br>c               | n<br>n         | 5/25/28<br>5/31/28 | 15.0<br>(12.4       | 35.9<br>35.6       | 8.19<br>8.15 | 16<br>21)                            |
| 5a          | 34         | ŏ            | r                     | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  |
| 6           | 35         | Ō            | c                     | n              | 5/31/28            | 12.4                | 35.6               | 8.15         | 21                                   |
| 6           | 36         | 50           | С                     | n              | 5/31/28            | 11.6                | 35.6               | 8.12         | 32                                   |
| 6           | 37         | 100          | С                     | n              | 5/31/28            | 11.3                | 35.6               | 8.08         | 41                                   |
| 6           | 42         | 0            | C                     | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  |
| 6b<br>6b    | 43<br>44   | 0            | oc<br>c               | n<br>n         | 5/31/28<br>5/31/28 | (12.4<br>(12.4      | 35.6<br>35.6       | 8.15<br>8.15 | 21)<br>21)                           |
| 6b          | 45         | ŏ            | oc                    | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  |
| 6b          | 46         | Ŏ            | oc                    | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  |
| 6c          | 48         | 0            | oc                    | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  |
| 6c          | 49         | 0            | c                     | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  |
| 7           | 56         | 0            | oc                    | n              | 7/13/28            | 8.9                 | 35.2               | 8.08         | 34                                   |
| 7<br>8<br>8 | 59<br>60   | 0<br>50      | oc                    | n              | 7/15/28<br>7/15/28 | 10.3<br>9.1         | 35.2<br>35.2       | 7.93<br>7.95 | 13<br>27                             |
| 8           | 61         | 100          | r<br>oc               | n<br>n         | 7/15/28            | 8.4                 | 35.3               | 7.95         | 54                                   |
| 8<br>9      | 64         | 0            | a                     | n              | 7/28/28            | 11.2                | 35.1               | 8.08         | 20                                   |
| 9           | 65         | 50           | a                     | n              | 7/28/28            | 8.4                 | 35.1               | 7.96         | 55                                   |
|             | 66         | 100          | a                     | n              | 7/28/28            | 7.6                 | 35.1               | 7.98         | 56                                   |
| 10          | 68         | 0            | a                     | n              | 7/30/28            | 10.9                | 34.9               | 8.08         | 28                                   |
| 10<br>11    | 69<br>73   | 50<br>0      | a                     | n              | 7/30/28<br>8/ 1/28 | 10.0<br>10.7        | 34.9<br>34.9       | 8.04<br>8.06 | 34<br>27                             |
| ii          | 74         | 50           | oc<br>oc              | n<br>n         | 8/ 1/28            | 7.3                 | 34.9               | 7.92         | 63                                   |
| îî          | 75         | 0            | r                     | p              | 8/ 1/28            | 10.7                | 34.9               | 8.06         | 27                                   |
| 11          | 76         | 50           | r                     | p              | 8/ 1/28            | 7.3                 | 34.9               | 7.92         | 63                                   |
| 11          | 77         | 100          | r                     | p              | 8/ 1/28            | 6.3                 | 35.1               | 7.90         | 66                                   |
| 11a         | 78         | 0            | a                     | n              | 8/ 1/28            | (10.7               | 34.9               | 8.06         | 27)                                  |
| 13<br>13a   | 83<br>89   | 0            | r                     | n<br>n         | 8/ 7/28<br>8/ 9/28 | 11.3<br>(21.2       | 32.7<br>35.2       | 8.09<br>8.18 | 19<br>11)                            |
| 14          | 93         | ŏ            | C                     | p              | 8/ 9/28            | 21.2                | 35.2               | 8.18         | 11'                                  |
| 14          | 95         | 50           | r                     | n              | 8/ 9/28            | 15.0                | 35.1               | 8.18         | 16                                   |
| 15          | 97         | 0            | oc                    | p              | 8/11/28            | 34.8                | 36.4               | 8.21         | 11                                   |
| 15          | 98         | 50           | oc                    | p              | 8/11/28            | 19.8                | 36.5               | 8.21         | 8                                    |
| 15<br>15    | 99<br>100  | 100          | oc                    | p              | 8/11/28            | 18.4                | 36.4               | 8.20         | 19                                   |
| 15<br>15    | 102        | 100          | oc<br>r               | n<br>n         | 8/11/28            | 24.8<br>18.4        | 36.4<br>36.4       | 8.21<br>8.20 | 11<br>19                             |
| 16          | 103        | 0            | r                     | p              | 8/11/28<br>8/13/28 | 25.9                | 36.2               | 8.24         | 8                                    |
| 16          | 104        | 50           | r                     | p              | 8/13/28            | 24.4                | 36.4               | 8.23         | 8                                    |
| 16          | 105        | 100          | r                     | p              | 8/13/28            | 19.9                | 36.5               | 8.17         | 13                                   |
| 16          | 106        | 0            | r                     | n              | 8/13/28            | 25.9                | 36.2               | 8.24         | 8                                    |
| 16<br>16    | 107<br>108 | 50<br>100    | r<br>oc               | n<br>n         | 8/13/28<br>8/13/28 | 24.4<br>19.9        | 36.4<br>36.5       | 8.23<br>8.17 | 8                                    |
| 17          | 109        | 0            | r                     | л<br>р         | 8/15/28            | 26.2                | 36.6               | 8.29         | 9                                    |
| 17          | 110        | -50          | oc                    | p              | 8/15/28            | 21.9                | 36.6               | 8.28         | 12                                   |
| 17          | 111        | 0            | a                     | n              | 8/15/28            | 26.2                | 36.6               | 8.29         | 12<br>9<br>5<br>5                    |
| 18          | 114        | 0            | oc                    | p              | 8/17/28            | 27.0                | 37.0               | 8.23         | 5                                    |
| 18          | 117        | 0            | r                     | n              | 8/17/28            | 27.0                | 37.0               | 8.23         | 5                                    |
| 22          | 139        | 0            | r                     | p              | 8/27/28            | 26.7                | 36.0               | 8.26         | 8                                    |
| 23<br>25    | 145<br>158 | 0<br>50      | r                     | p              | 8/29/28<br>9/ 3/28 | 27.2<br>21.5        | 35.9<br>36.0       | 8.25<br>8.22 | 12                                   |
| 33          | 197A       | 0            | r                     | p              | 10/ 8/28           | 28.5                | 35.6               | 8.23         | 4                                    |
| 35          | 207        | 50           | r                     | p              | 10/26/28           | 16.8                | 34.7               | 7.92         | 138                                  |
| 37          | 219        | 100          | r                     | n              | 11/ 1/28           | 15.1                | 34.9               | 7.82         | 153                                  |

Table 21. Distributional and environmental records for Ceratium fusus--Continued

|             | Table 21.   |           | ational and en        | vii oiimie     | ntal record          | is for Ceratium     | TususC             | ontinue      | u                                    |
|-------------|-------------|-----------|-----------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| Station     | Sample      | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 40          | 232         | 0         | r                     |                | 11 / 0 /90           | 22.2                | 22 7               | 0.01         | 0.4                                  |
| 41          | 236         | 50        | r                     | p<br>n         | 11/ 8/28<br>11/10/28 | 14.6                | 33.7<br>35.0       | 8.21<br>7.94 | 24<br>58                             |
| 41a         | 240         | 0         | r                     | n              | 11/13/28             | (18.7               | 34.7               | 8.06         | 45)                                  |
| 45          | 256         | 0         | r                     | n              | 11/19/28             | 22.4                | 35.3               | 8.12         | 38                                   |
| 45          | <b>25</b> 8 | 100       | r                     | n              | 11/19/28             | 18.6                | 35.1               | 8.00         | 50                                   |
| 45          | 259         | 0         | oc                    | p              | 11/19/28             | 22.4                | 35.3               | 8.12         | 38                                   |
| 45<br>47    | 260<br>267  | 50-0      | oc                    | p              | 11/19/28             | 22.4                | 35.2               | 8.13         | 46                                   |
| 50          | 285         | 50<br>50  | r                     | n              | 11/23/28<br>11/29/28 | 23.8<br>22.0        | 36.0               | 8.23         | 20                                   |
| 50          | 286         | 100       | r                     | n<br>n         | 11/29/28             | 20.5                | 35.9<br>35.7       | 8.23<br>8.22 | 13<br>13                             |
| 50          | 289         | 100       | r                     | p              | 11/29/28             | 20.5                | 35.7               | 8.22         | 13                                   |
| 50-51       | 292         | 0         | r                     | 'n             | 12/ 1/28             | (22.8               | 35.6               | 8.22         | 16)                                  |
| 51          | 293         | 0         | r                     | n              | 12/ 1/28             | 22.8                | 35.6               | 8.22         | 16                                   |
| 51          | 295         | 100       | r                     | n              | 12/ 1/28             | 20.0                | 35.6               | 8.22         | 17                                   |
| 58          | 341         | 0         | oc                    | n              | 12/22/28             | 17.0                | 34.0               | 8.12         | 20                                   |
| 58<br>58    | 342<br>344  | 50<br>0   | oc                    | n              | 12/22/28<br>12/22/28 | 14.8                | 34.0               | 8.12         | 25                                   |
| 58          | 345         | 50        | r                     | p              | 12/22/28             | 17.0<br>14.8        | 34.0<br>34.0       | 8.12<br>8.12 | 20<br>25                             |
| 59          | 348         | 0         | r                     | p<br>n         | 12/24/28             | 16.3                | 34.0               | 8.10         | 38                                   |
| 59          | 350         | 100       | oc                    | n              | 12/24/28             | 11.4                | 34.1               | 8.03         | 72                                   |
| 59          | 351         | 0         | oc                    | p              | 12/24/28             | 16.3                | 34.0               | 8.10         | 38                                   |
| 59          | 352         | 50        | r                     | p              | 12/24/28             | 14.0                | 34.0               | 8.08         | 38                                   |
| 60          | 355         | 50        | oc                    | n              | 12/26/28             | 13.4                | 34.0               | 8.06         | 54                                   |
| 60          | 356         | 100       | oc                    | n              | 12/26/28             | 10.6                | 34.0               | 8.03         | 62                                   |
| 60<br>60    | 358<br>359  | 50<br>0   | r                     | p              | 12/26/28<br>12/26/28 | 13.4<br>15.0        | 34.0<br>34.0       | 8.06         | 54                                   |
| 60-61       | 362         | ő         | r                     | p<br>n         | 12/26/28             | (15.0               | 34.0               | 8.07         | 50<br>50)                            |
| 61          | 368         | 100       | r                     | p              | 12/28/28             | 10.8                | 34.0               | 8.03         | 80                                   |
| 61-62       | 370         | 0         | r                     | n              | 12/28/28             | (16.9               | 34.0               | 8.05         | 46)                                  |
| 62          | 373         | 100       | r                     | n              | 12/30/28             | 13.1                | 34.2               | 8.06         | 48                                   |
| 63-64       | 392         | 0         | r                     | n              | 1/ 1/29              | (20.5               | 34.6               | 8.07         | 21)                                  |
| 64<br>64-65 | 395         | 50        | r                     | n              | 1/ 3/29              | 17.2                | 34.6               | 8.12         | 29                                   |
| 64-65       | 401<br>402  | 0         | r                     | n              | 1/ 3/29<br>1/ 3/29   | (20.6<br>(20.6      | 34.6               | 8.12         | 21)                                  |
| 64-65       | 403         | ő         | r                     | n<br>n         | 1/ 3/29              | (20.6               | 34.6<br>34.6       | 8.12<br>8.12 | 21)<br>21)                           |
| 65          | 408         | Ö         | r                     | p              | 1/ 5/29              | 20.2                | 34.5               | 8.10         | 24                                   |
| 65          | 409         | 50        | r                     | p              | 1/ 5/29              | 16.5                | 34.5               | 8.10         | 25                                   |
| 67          | 416         | 0         | oc                    | n              | 1/8/29               | 19.3                | 34.9               | 8.11         | 21                                   |
| 68          | 422         | 0         | r                     | p              | 1/10/29              | 19.2                | 35.1               | 8.14         | 29                                   |
| 68<br>69    | 423         | 50        | r                     | p              | 1/10/29              | 18.2                | 35.0               | 8.14         | 29                                   |
| 70          | 427<br>434  | 0         | r                     | p              | 1/12/29<br>1/13/29   | 21.1<br>21.2        | 35.2<br>35.1       | 8.12<br>8.05 | 62<br>103                            |
| 71          | 439         | 50        | r                     | p<br>n         | 2/6/29               | 16.7                | 35.1               | 7.90         | 150                                  |
| 71          | 440         | 100       | r                     | n              | 2/6/29               | 13.9                | 35.0               | 7.71         | 220                                  |
| 71          | 441         | 0         | oc                    | p              | 2/6/29               | 23.5                | 35.2               | 8.13         | 58                                   |
| 71          | 442         | 50        | r                     | p              | 2/6/29               | 16.7                | 35.1               | 7.90         | 150                                  |
| 72          | 444         | 50        | r                     | n              | 2/ 8/29              | 18.7                | 35.4               | 8.12         | 60                                   |
| 72<br>72    | 446<br>448  | 100       | r                     | p              | 2/ 8/29              | 24.9                | 35.3               | 8.16         | 50                                   |
| 74          | 459         | 0         | r<br>oc               | p<br>p         | 2/ 8/29<br>2/12/29   | 14.8<br>24.2        | 35.0<br>35.6       | 7.94<br>8.17 | 154<br>68                            |
| 75          | 466         | 50        | r                     | p              | 2/14/29              | 20.0                | 35.5               | 8.14         | 46                                   |
| 76          | 467         | 0         | r                     | n              | 2/16/29              | 23.4                | 35.9               | 8.15         | 50                                   |
| 76          | 471         | 50        | r                     | p              | 2/16/29              | 22.1                | 35.9               | 8.14         | 42                                   |
| 78          | 476         | 50        | r                     | n              | 2/20/29              | 23.8                | 36.1               | 8.14         | 32                                   |
| 78          | 477         | 100       | r                     | n              | 2/20/29              | 21.9                | 36.2               | 8.14         | 34                                   |
| 78<br>78    | 478<br>479  | 0<br>50   | r<br>oc               | p              | 2/20/29<br>2/20/29   | 24.6                | 36.0               | 8.17         | 32                                   |
| 78          | 480         | 100       | r                     | p<br>p         | 2/20/29              | 23.8<br>21.9        | 36.1<br>36.2       | 8.14<br>8.14 | 32<br>34                             |
| 79          | 483         | 100       | r                     | n              | 2/22/29              | 21.8                | 36.2               | 8.13         | 45                                   |
| 80          | 488         | 0         | ос                    | p              | 2/24/29              | 26.0                | 35.9               | 8.30         | 36                                   |
| 80          | 489         | 50        | oc                    | p              | 2/24/29              | 25.9                | 36.0               | 8.19         | 29                                   |
| 80          | 490         | 100       | ОС                    | p              | 2/24/29              | 23.4                | 36.2               | 8.16         | 32                                   |
| 81          | 493         | 0         | oc                    | p              | 2/26/29              | 26.5                | 35.8               | 8.19         | 38                                   |
| 81<br>81    | 494<br>495  | 50<br>100 | r                     | p              | 2/26/29              | 26.4<br>23.6        | 35.9               | 8.19         | 38                                   |
| 82          | 495         | 0         | oc                    | p<br>p         | 2/26/29<br>2/28/29   | 27.2                | 36.2<br>36.3       | 8.18<br>8.21 | 36<br>34                             |
| 82          | 500         | 100       | r                     | p              | 2/28/29              | 24.4                | 36.5               | 8.19         | 34                                   |
| 85          | 513         | 50        | oc                    | p              | 3/6/29               | (27.8               | 36.2               | 8.22         | 40                                   |
| 85          | 514         | 100       | r                     | p              | 3/6/29               | 25.2                | 36.3               | 8.23         | 42                                   |
| 86          | 519         | 50        | r                     | p              | 3/ 9/29              | 27.4                | 35.2               | 8.29         | 17                                   |
| 89          | 530         | 0         | r                     | p              | 3/23/29              | 28.4                | 35.6               | 8.25         | 21                                   |
| 90          | 536         | 50        | r                     | p              | 3/25/29              | 28.6                | 35.6               | 8.26         | 21                                   |
|             | 549         | 100       | r                     | p              | 3/29/29              | 26.2                | 36.0               | 8.28         | 28                                   |
| 92          | 551         | 50        | 00                    |                | 3 / 31 / 20          | 28 5                | 34 8               | 8 30         | 28                                   |
| 93<br>93    | 551<br>552  | 50<br>0   | oc                    | n<br>p         | 3/31/29<br>3/31/29   | 28.5<br>28.7        | 34.8<br>34.7       | 8.30<br>8.30 | 28<br>28                             |

Table 21. Distributional and environmental records for Ceratium fusus--Concluded

| Samoa   S55  |         | ,      | ,         |    |     |          |       |      |      |                                      |
|--|---------|--------|-----------|----|-----|----------|-------|------|------|--------------------------------------|
| Samoa 5555 0 r n n 4/ /29  | Station | Sample | Depth (m) |    |     | Date     |       |      | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 95 566 50  |         |        | _         |    |     |          |       |      |      |                                      |
| 95 566 50  |         |        |           |    |     | 4/ /29   | ****  |      |      |                                      |
| 95 566 50 oc p 4/24/29 (29.3 34.9 8.24 95 568A 0 oc n 4/24/29 (29.3 4 34.7 8.26 96 572 50 oc p 4/26/29 (29.2 35.3 8.23 98 584 0 oc p 4/26/29 (29.2 35.3 8.23 98 584 0 oc p 4/26/29 (29.2 35.3 8.26 100 602 100 r p 5/4/29 27.6 33.7 8.22 110 666 100 r p 5/31/29 17.9 34.7 8.14 111 668 100 r p 5/31/29 17.9 34.7 8.14 111 668 0 oc n 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.5 8.18 111 672 50 oc p 6/3/29 20.1 34.5 8.18 111 672 50 oc p 6/3/29 20.1 34.5 8.18 112 677 0 r p 6/5/29 23.2 34.6 8.22 114 688 100 r p 6/27/29 119.9 34.3 8.15 115 692 0 oc p 6/27/29 119.9 34.5 8.00 115 693 50 r n 6/29/29 20.6 34.6 8.19 115 693 50 r n 6/29/29 17.5 34.6 8.19 115 698 100 r p 6/29/29 17.5 34.6 8.12 115 698 100 r p 6/29/29 17.5 34.6 8.12 115 698 100 r p 6/29/29 17.5 34.6 8.12 115 698 100 r p 7/1/29 (18.3 34.3 8.18 116 706 50 r p 7/1/29 (18.3 34.3 8.18 116 706 50 r p 7/1/29 (18.3 34.3 8.18 1120 726 0 oc p 7/9/29 2.2 33.1 7.90 1 120 727 50 r p 7/1/29 (18.3 34.3 8.18 1120 727 50 r p 7/1/29 10.6 33.8 8.11 120 726 0 oc p 7/9/29 2.2 33.1 7.90 1 120 727 50 r p 7/9/29 2.2 33.1 7.90 1 121 733 50 r p 7/9/29 2.2 33.1 7.90 1 121 733 50 r p 7/9/29 2.2 33.1 7.90 1 121 735 0 oc p 7/1/29 7.5 32.9 7.98 1 121 736 500 r p 7/1/29 3.6 33.1 7.90 1 121 737 100 r p 7/1/29 3.6 33.1 7.90 1 121 737 100 r p 7/1/29 3.6 33.1 7.90 1 121 736 500 r p 7/1/29 3.6 33.1 7.90 1 121 737 100 r p 7/1/29 2.1 33.2 7.86 1 121 736 500 r p 7/1/29 2.1 33.2 7.86 1 121 737 44 0 oc n 7/11/29 2.1 33.2 7.86 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 7.90 1 122 741 0 oc n 7/11/29 3.6 33.1 3.2 7.86 1 122 744 50 oc n 7/11/29 3.6 33.1 3.2 8.03 1 125 756 50 oc n 7/11/29 9.3 3.2 3.2 8.03 1 125 756 50 oc n 7/11/29 9.3 3.3 3.2 8.04 1 125 756 50 oc n 7/11 |         |        |           |    | p   | 4/22/29  |       |      |      | 14                                   |
| 95 568A 0 oc n 4/24/29 (29.4 34.7 8.26 96 572 50 oc p 4/26/29 29.2 35.3 8.23 98 584 0 oc p 4/30/29 27.0 35.3 8.16 100 602 100 r p 5/4/29 27.0 6 34.7 8.22 110 666 100 r p 5/31/29 17.9 34.7 8.12 111 668 0 r n 6/3/29 20.1 34.5 8.18 111 669 50 oc n 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.6 8.17 111 671 0 oc p 6/3/29 20.1 34.6 8.17 111 672 50 oc p 6/3/29 20.1 34.6 8.17 112 677 0 r p 6/5/29 23.2 34.6 8.22 114 688 100 r p 6/27/29 19.4 34.6 8.17 112 677 0 r p 6/27/29 19.9 34.3 8.16 115 683 50 r p 6/27/29 19.9 34.3 8.15 8.10 115 683 50 r n 6/28/29 17.5 34.6 8.19 115 683 50 r n 6/28/29 17.5 34.6 8.19 115 683 100 r p 6/28/29 17.5 34.6 8.19 115 683 100 r p 6/28/29 17.5 34.6 8.10 115 115 700 0 r p 6/28/29 17.5 34.6 8.10 116 706 50 r p 7/1/29 10.6 33.8 8.11 120 726 0 oc p 7/9/29 7.2 33.0 7.98 1120 727 50 r n 7/9/29 7.2 33.0 7.98 1120 727 50 r n 7/9/29 7.2 33.0 7.98 1120 727 50 r n 7/1/29 10.6 33.8 8.11 120 727 50 r n 7/9/29 7.2 33.0 7.98 1121 732 0 c n 7/1/29 10.6 33.8 8.11 120 727 750 r n 7/1/29 10.6 33.8 8.11 120 727 750 r n 7/1/29 10.6 33.8 8.11 120 727 750 r n 7/9/29 7.2 33.0 7.98 1121 733 50 r n 7/1/29 3.6 33.1 7.90 1121 733 50 r n 7/11/29 3.6 33.1 7.90 1121 733 100 r n 7/11/29 3.6 33.1 7.90 1121 734 100 r n 7/11/29 3.6 33.1 7.92 1121 735 0 oc p 7/9/29 2.2 33.1 7.90 121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 736 50 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1121 737 100 r n 7/11/29 3.6 33.1 7.92 1122 741 0 oc p 7/11/29 3.6 33.1 7.92 1122 741 0 oc p 7/11/29 3.6 33.1 7.92 1123 745 50 oc n 7/11/29 3.6 33.1 7.92 1122 744 50 oc n 7/11/29 3.6 33.1 33.1 8.11 122 745 50 oc n 7/11/29 3.6 33.1 33.1 8.11 122 745 50 |         |        |           |    | p   | 4/24/29  |       |      |      | 16                                   |
| 96 572 50 oc p 4/26/29 29.2 35.3 8.23 100 602 100 r p 5/4/29 27.0 35.3 8.16 100 602 100 r p 5/4/29 27.6 34.7 8.22 110 666 100 r p 5/3/129 17.9 34.7 8.14 111 668 0 r n n 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.5 8.18 111 672 50 oc p 6/3/29 20.1 34.5 8.18 111 672 50 oc p 6/3/29 20.1 34.5 8.18 111 672 677 0 r p 6/5/29 23.2 34.6 8.12 114 688 100 r p 6/27/29 119.4 34.6 8.17 115 682 0 oc p 6/27/29 13.0 34.5 8.18 116 688 100 r p 6/27/29 13.0 34.5 8.00 115 683 50 r p 6/28/29 20.6 34.6 8.19 115 683 50 r p 6/28/29 11.5 34.6 8.12 115 683 100 r p 6/28/29 11.5 34.6 8.12 115 683 700 0 r p 6/28/29 11.6 34.6 8.12 115 683 700 0 r p 6/28/29 11.6 34.6 8.12 115 683 700 0 r p 7/1/29 10.6 33.8 8.11 120 727 50 r p 7/1/29 10.6 33.8 8.11 120 726 0 oc p 7/9/29 2.2 33.1 7.90 1 120 728 0 r p 7/9/29 2.2 33.1 7.90 1 120 729 0 r p 7/9/29 2.2 33.1 7.90 1 120 729 0 r p 7/9/29 2.2 33.1 7.90 1 121 733 50 r n 7/1/29 3.6 33.1 7.90 121 733 50 r n 7/1/29 3.6 33.1 7.90 121 733 50 r n 7/1/29 3.6 33.1 7.90 121 735 0 oc p 7/1/29 3.6 33.1 7.90 121 737 100 r p 7/1/29 3.6 33.1 7.90 121 738 0 c n 7/11/29 2.1 33.2 7.86 1 121 735 0 oc p 7/1/29 2.1 33.2 7.86 1 121 735 0 oc p 7/1/29 3.6 33.1 7.90 121 737 100 r p 7/1/29 8.2 32.8 8.03 122 740 100 r n 7/1/29 8.2 32.8 8.03 123 745 50 oc n 7/11/29 9.3 6.3 33.1 7.90 124 747 0 oc p 7/11/29 9.3 6.3 33.1 7.90 125 756 50 oc n 7/11/29 9.3 32.7 8.04 1 124 752 0 r p 7/11/29 9.3 32.7 8.04 1 125 756 50 oc n 7/15/29 8.1 32.8 8.03 125 756 50 oc n 7/15/29 8.1 32.8 8.03 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 124 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 758 0 oc n 7/19/29 9.3 32.7 8.04 1 126 777 50 oc p 7/28/29 8.2 32.8 8.03 127 777 100 r p 7/1/29 9.3 32.7 8.04 1 128 777 50 oc p 7/1/29 9.3 32.7 8.04 1 129 777 50 oc p 7/1/29 9.3 32.7 8.04 1 121 737 100 r p 7/1/29 9.3 32.7 8.04 1 122 741 0 oc p 7/1/29 9.3 32.7 8.04 1 123 745 50 oc p 7/1/29 9.3 32.7 8.04 1 124 755 0 oc p 7/1/29 9.3 32.7 8.04 1 125 758 0 oc n 7/1/29 9.3 32.7 8.04 1 126 777 100 r p 9/1/29/29 10.5 32.8 8.03 1 125 758 0 oc  |         |        |           | oc | р   | 4/24/29  |       |      |      | 16                                   |
| 96 572 50 oc p 4/26/29 29.2 35.3 8.23 100 602 100 r p 5/4/29 27.0 35.3 8.16 100 602 100 r p 5/4/29 27.0 34.7 8.22 110 666 100 r p 5/3/129 17.9 34.7 8.14 111 668 0 r n n 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.5 8.18 111 671 0 oc p 6/3/29 20.1 34.5 8.18 111 672 50 oc p 6/3/29 20.1 34.5 8.18 111 672 50 oc p 6/3/29 20.1 34.5 8.18 111 673 0 r p 6/3/29 19.4 34.6 8.17 112 677 0 r p 6/5/29 23.2 34.6 8.22 114 688 100 r p 6/27/29 13.0 34.5 8.18 115 682 0 oc p 6/27/29 13.0 34.5 8.00 115 683 50 r p 6/28/29 10.6 34.6 8.19 115 683 100 r p 6/28/29 11.5 34.6 8.12 115 683 100 r p 6/28/29 11.5 34.6 8.12 115 683 100 r p 6/28/29 11.5 34.6 8.12 115 683 100 r p 6/28/29 11.6 34.6 8.12 115 683 100 r p 6/28/29 11.6 34.6 8.12 115 115 680 100 r p 7/1/29 10.6 33.8 8.11 120 727 50 r p 7/1/29 10.6 33.8 8.11 120 726 0 oc p 7/9/29 2.2 33.1 7.90 1 120 727 50 r n 7/9/29 2.2 33.1 7.90 1 120 728 0 r p 7/9/29 2.2 33.1 7.90 1 120 729 0 r p 7/9/29 2.2 33.1 7.90 1 121 733 50 r n 7/11/29 3.6 33.1 7.90 121 733 50 r n 7/11/29 3.6 33.1 7.90 121 733 50 r n 7/11/29 3.6 33.1 7.90 121 733 50 r n 7/11/29 3.6 33.1 7.90 121 733 50 r n 7/11/29 2.1 33.2 7.86 1 121 733 50 r n 7/11/29 2.1 33.2 7.86 1 121 734 100 r p 7/1/29 8.1 33.2 7.86 1 121 735 0 oc p 7/1/29 8.1 33.2 7.86 1 122 738 0 c n 7/11/29 2.1 33.2 7.86 1 123 744 0 oc p 7/1/29 8.1 33.2 7.86 1 124 745 0 oc p 7/1/29 9.3 32.7 8.04 1 125 756 50 oc n 7/15/29 8.1 32.8 8.03 1 125 756 50 oc n 7/15/29 8.1 32.8 8.03 1 125 756 50 oc n 7/15/29 8.1 32.8 8.03 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 121 737 100 r p 7/1/29 9.3 32.7 8.04 1 122 740 0 oc p 7/1/29 9.3 32.7 8.04 1 123 745 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 8.2 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 125 758 50 oc n 7/19/29 10.5 32.8 8.03 1 125 758 50 oc n 7/19/29 10.5 32.8 8.03 | 95      | 568A   | 0         | oc | n   | 4/24/29  | (29.4 | 34.7 | 8.26 | 14)                                  |
| 98 584 0 oc p 4/30/29 27.0 35.3 8.16 100 602 100 r p 5/4/29 27.6 34.7 8.22 110 666 100 r p 5/31/29 17.9 34.7 8.22 111 668 0 r n 6/3/29 20.1 34.5 8.18 111 669 50 oc n 6/3/29 19.4 34.6 8.17 111 671 0 oc p 6/3/29 19.4 34.6 8.17 111 671 0 oc p 6/3/29 19.4 34.6 8.17 112 677 0 r p 6/5/29 23.2 34.6 8.18 114 688 100 r p 6/27/29 119.0 34.5 8.00 114 688 0 oc p 6/27/29 119.0 34.5 8.00 114 689 0 oc p 6/27/29 119.0 34.5 8.00 115 692 0 oc p 6/27/29 119.9 34.3 8.15 115 693 50 r n 6/29/29 17.5 34.6 8.19 115 693 50 r n 6/29/29 17.5 34.6 8.19 115 698 100 r p 6/29/29 17.5 34.6 8.19 115 698 100 r p 6/29/29 17.5 34.6 8.10 116 706 5 r p 7/1/29 (18.3 34.3 8.18 116 706 5 r r n 7/1/29 (18.3 34.3 8.18 120 726 0 oc p 7/9/29 7.2 33.0 7.98 1 120 727 50 r n 7/9/29 2.2 33.1 7.90 1 120 729 0 r r p 7/9/29 7.2 33.0 7.98 1 120 729 0 r r n 7/9/29 2.2 33.1 7.90 1 120 733 50 oc p 7/9/29 2.2 33.1 7.90 1 121 732 0 c n 7/11/29 10.6 33.2 7.98 1 121 733 50 r n 7/11/29 10.6 33.3 34.3 8.11 120 727 50 r n 7/9/29 2.2 33.1 7.90 1 121 732 0 c n 7/11/29 3.6 33.1 7.90 1 122 738 0 oc p 7/9/29 2.2 33.1 7.90 1 121 733 100 r n 7/11/29 3.6 33.1 7.92 1 121 735 0 oc p 7/1/29 2.1 33.2 7.86 1 121 736 50 oc p 7/1/29 2.1 33.2 7.86 1 122 740 100 r n 7/11/29 2.1 33.2 7.86 1 123 744 0 oc n 7/11/29 3.6 33.1 7.90 1 123 744 0 oc n 7/15/29 8.1 32.8 7.98 1 124 752 0 r n 7/11/29 9.3 3.2 8.7 98 1 125 756 50 oc n 7/15/29 8.1 32.8 7.98 1 122 740 100 r n 7/11/29 9.3 3.2 8.7 98 1 123 744 0 oc n 7/15/29 8.1 32.8 7.98 1 124 752 0 r n 7/11/29 9.3 32.7 8.04 1 125 756 50 oc n 7/15/29 8.1 32.8 8.03 1 125 756 50 oc n 7/15/29 8.1 32.8 7.98 1 127 772 100 r p 7/11/29 9.3 32.7 8.04 1 128 775 100 r p 7/11/29 9.3 33.4 8.34 131 795 0 or n 7/11/29 9.3 33.4 8.34 131 883 100 or n 7/15/29 8.1 33.4 8.34 131 883 100 or n 7/11/29 2.3 3.5 3.4 8.34 131 883 100 or n 7/11/29 3.3 3.4 8.34 131 883 100 or n 10/9/29 11.8 33.4 8.34  |         | 572    | 50        | oc | р   | 4/26/29  |       |      | 8.23 | 12                                   |
| 100  | 98      | 584    | 0         | oc |     | 4/30/29  | 27.0  | 35.3 | 8.16 | 24                                   |
| 110  | 100     | 602    | 100       | r  |     | 5/4/29   | 27.6  | 34.7 | 8.22 | 12                                   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  | 110     | 666    | 100       | r  |     | 5/31/29  |       |      |      | 11                                   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  | 111     | 668    | 0         | r  |     | 6/ 3/29  |       |      | 8.18 | 11<br>5<br>5<br>5<br>7               |
| 114       688       100       r       p       6/27/29       13.0       34.5       8.00         115       692       0       oc       p       6/29/29       20.6       34.6       8.19         115       693       50       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       7/1/29       (18.3       34.3       8.18         115       700       0       r       n       7/1/29       (18.3       34.3       8.18         116       706       50       r       n       7/1/29       10.6       33.8       8.11         120       726       0       oc       p       7/9/29       7.2       33.0       7.98       1         120       729       0       r       n       7/1/29       7.2       33.0       7.98       1         120       730       50       oc       p       7/9/29       2.2       33.1       7.90       1         121       733       50  |         |        |           |    |     | 6/ 3/29  |       |      |      | 5                                    |
| 114       688       100       r       p       6/27/29       13.0       34.5       8.00         115       692       0       oc       p       6/29/29       20.6       34.6       8.19         115       693       50       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       7/1/29       (18.3       34.3       8.18         115       700       0       r       n       7/1/29       (18.3       34.3       8.18         116       706       50       r       n       7/1/29       10.6       33.8       8.11         120       726       0       oc       p       7/9/29       7.2       33.0       7.98       1         120       729       0       r       n       7/1/29       7.2       33.0       7.98       1         120       730       50       oc       p       7/9/29       2.2       33.1       7.90       1         121       733       50  |         |        | 0         |    |     | 6/3/29   | 20.1  |      |      | 5                                    |
| 114       688       100       r       p       6/27/29       13.0       34.5       8.00         115       692       0       oc       p       6/29/29       20.6       34.6       8.19         115       693       50       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       7/1/29       (18.3       34.3       8.18         115       700       0       r       n       7/1/29       (18.3       34.3       8.18         116       706       50       r       n       7/1/29       10.6       33.8       8.11         120       726       0       oc       p       7/9/29       7.2       33.0       7.98       1         120       729       0       r       n       7/1/29       7.2       33.0       7.98       1         120       730       50       oc       p       7/9/29       2.2       33.1       7.90       1         121       733       50  |         |        |           |    |     | 6/ 3/29  |       |      |      | 5                                    |
| 114       688       100       r       p       6/27/29       13.0       34.5       8.00         115       692       0       oc       p       6/29/29       20.6       34.6       8.19         115       693       50       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       6/29/29       17.5       34.6       8.12         115       698       100       r       n       7/1/29       (18.3       34.3       8.18         115       700       0       r       n       7/1/29       (18.3       34.3       8.18         116       706       50       r       n       7/1/29       10.6       33.8       8.11         120       726       0       oc       p       7/9/29       7.2       33.0       7.98       1         120       729       0       r       n       7/1/29       7.2       33.0       7.98       1         120       730       50       oc       p       7/9/29       2.2       33.1       7.90       1         121       733       50  |         |        |           |    |     | 6/ 5/29  |       |      |      | 7                                    |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |         |        |           |    |     | 6/27/29  |       |      |      | 91                                   |
| 115 693 50 r n 6/29/29 17.5 34.6 8.08 115a 700 0 r p 6/29/29 15.6 34.6 8.08 115a 700 0 r n 7/1/29 (18.3 34.3 8.18 116 706 50 r p 7/1/29 10.6 33.8 8.18 1120 726 0 oc p 7/9/29 7.2 33.0 7.98 1 120 727 50 r n 7/9/29 7.2 33.0 7.98 1 120 729 0 r p 7/9/29 7.2 33.0 7.98 1 120 730 50 oc p 7/9/29 7.2 33.0 7.98 1 121 732 0 c n 7/11/29 3.6 33.1 7.90 1 121 732 0 c n 7/11/29 3.6 33.1 7.90 1 121 735 0 oc p 7/11/29 3.6 33.1 7.92 1 121 735 0 oc p 7/11/29 3.6 33.1 7.92 1 121 735 0 oc p 7/11/29 3.6 33.1 7.92 1 121 734 100 r n 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 3.6 33.1 7.92 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 7/19/29 10.5 32.8 8.03 1 128 774 50 oc p 7/19/29 10.5 32.8 8.03 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 125 755 0 oc p 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 9/12/29 1.1 8 33.1 8.11 1 130 787 0 oc p 7/19/29 1.8 33.1 8.11 1 131 795 0 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 142 874 100 r n 10/9/29 13.8 34.1 8.30 1 144 883 100 oc n 10/9/29 13.8 34.1 8.30 1  |         |        |           |    |     | 6/27/29  |       |      |      | 7                                    |
| 115 693 50 r n 6/29/29 17.5 34.6 8.08 115a 700 0 r p 6/29/29 15.6 34.6 8.08 115a 700 0 r n 7/1/29 (18.3 34.3 8.18 116 706 50 r p 7/1/29 10.6 33.8 8.18 1120 726 0 oc p 7/9/29 7.2 33.0 7.98 1 120 727 50 r n 7/9/29 7.2 33.0 7.98 1 120 729 0 r p 7/9/29 7.2 33.0 7.98 1 120 730 50 oc p 7/9/29 7.2 33.0 7.98 1 121 732 0 c n 7/11/29 3.6 33.1 7.90 1 121 732 0 c n 7/11/29 3.6 33.1 7.90 1 121 735 0 oc p 7/11/29 3.6 33.1 7.92 1 121 735 0 oc p 7/11/29 3.6 33.1 7.92 1 121 734 100 r n 7/11/29 7.5 32.9 7.98 1 121 734 100 r n 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 3.6 33.1 7.92 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 9.3 32.7 8.04 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 777 100 r p 7/19/29 10.5 32.8 8.03 1 128 777 50 oc p 7/19/29 10.5 32.8 8.03 1 129 774 50 oc p 7/19/29 10.5 32.8 8.03 1 120 777 50 oc p 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 777 50 oc p 7/19/29 10.5 32.8 8.03 1 128 777 50 oc p 7/19/29 10.5 32.8 8.03 1 129 774 50 oc p 7/19/29 10.5 32.8 8.03 1 120 774 50 oc p 7/19/29 10.5 32.8 8.03 1 121 774 50 oc p 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 9/19/29 10.5 32.8 8.03 1 128 777 50 oc p 7/19/29 10.5 32.8 8.03 1 129 774 50 oc p 7/19/29 10.5 32.8 8.03 1 120 0 0 0 0 0  |         |        |           |    |     | 6/29/29  |       |      |      | 4                                    |
| 115 698 100 r p 6/29/29 15.6 34.6 8.08 1152 700 0 r n 7/1/29 10.6 33.8 8.18 116 706 50 r p 7/1/29 10.6 33.8 8.18 120 726 0 oc p 7/9/29 7.2 33.0 7.98 120 729 0 r p 7/9/29 7.2 33.0 7.98 121 732 0 c n 7/1/29 7.5 33.1 7.90 121 732 0 c n 7/11/29 7.5 32.9 7.98 121 733 50 r n 7/11/29 7.5 32.9 7.98 121 733 50 r n 7/11/29 7.5 32.9 7.98 121 733 50 r n 7/11/29 7.5 32.9 7.98 121 734 100 r n 7/11/29 2.1 33.2 7.86 121 737 100 r p 7/11/29 2.1 33.2 7.86 121 737 100 r p 7/11/29 3.6 33.1 7.92 122 738 0 c n 7/13/29 8.2 32.8 7.98 122 738 0 c n 7/13/29 8.2 32.8 7.98 122 738 0 c n 7/13/29 8.2 32.8 7.98 122 740 100 r n 7/13/29 8.2 32.8 7.98 123 745 50 oc n 7/15/29 8.1 32.8 7.98 123 745 50 oc n 7/15/29 8.1 32.8 8.03 124 749 0 oc n 7/15/29 3.0 33.4 7.90 123 746 100 oc n 7/15/29 3.0 33.4 7.90 124 749 0 oc n 7/15/29 3.0 33.4 7.90 125 755 0 oc n 7/15/29 4.4 32.9 7.94 124 749 0 oc n 7/15/29 3.0 33.4 7.90 125 755 0 oc n 7/19/29 10.5 32.8 8.03 124 749 0 oc n 7/15/29 3.0 33.4 7.90 125 755 0 oc n 7/19/29 5.5 32.8 7.98 126 775 100 c n 7/19/29 10.5 32.8 8.03 127 777 100 c p 7/19/29 5.5 32.8 7.98 128 7775 100 c n 7/19/29 5.5 32.8 7.98 129 779 100 c n 7/19/29 10.5 32.8 8.03 125 756 50 oc n 7/19/29 10.5 32.8 8.03 125 757 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 757 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 10.5 32.8 8.03 125 759 50 oc p 7/19/29 3.3 33.4 8.34                                   |         |        |           |    |     | 6/20/20  |       |      |      | 17                                   |
| 115a 700 0 r n 7 / 1/29 (18.3 34.3 8.18 1120 726 0 oc p 7 / 1/29 10.6 33.8 8.11 120 726 0 oc p 7 / 9/29 7.2 33.0 7.98 1120 727 50 r n 7 / 9/29 7.2 33.0 7.98 1120 730 50 oc p 7 / 9/29 7.2 33.1 7.90 1121 732 0 c n 7 / 11/29 7.5 32.9 7.98 1121 732 0 c n 7 / 11/29 7.5 32.9 7.98 1121 735 0 oc p 7 / 11/29 7.5 32.9 7.98 1121 735 0 oc p 7 / 11/29 7.5 32.9 7.98 1121 735 0 oc p 7 / 11/29 7.5 32.9 7.98 1121 736 50 r n 7 / 11/29 3.6 33.1 7.92 1121 736 50 r p 7 / 11/29 3.6 33.1 7.92 1121 736 50 r p 7 / 11/29 3.6 33.1 7.92 1121 737 100 r p 7 / 11/29 3.6 33.1 7.92 1121 737 100 r p 7 / 11/29 3.6 33.1 7.92 1122 738 0 c n 7 / 13/29 8.2 32.8 7.98 1122 740 100 r n 7 / 13/29 8.2 32.8 7.98 1122 741 0 oc p 7 / 13/29 8.2 32.8 7.98 1122 744 0 oc n 7 / 15/29 8.1 32.8 8.03 1123 745 50 oc n 7 / 15/29 8.1 32.8 8.03 1123 745 50 oc n 7 / 15/29 8.1 32.8 8.03 1123 745 50 oc n 7 / 15/29 8.1 32.8 8.03 1123 747 0 oc p 7 / 15/29 8.1 32.8 8.03 1123 747 0 oc n 7 / 15/29 8.1 32.8 8.03 1123 747 0 oc n 7 / 15/29 8.1 32.8 8.03 1123 747 0 oc n 7 / 15/29 8.1 32.8 8.03 1123 747 0 oc n 7 / 15/29 8.1 32.8 8.03 1124 749 0 oc n 7 / 15/29 8.1 32.8 8.03 1124 749 0 oc n 7 / 15/29 8.1 32.8 8.03 1125 755 0 oc n 7 / 19/29 5.5 32.8 7.98 1122 755 756 50 oc n 7 / 19/29 5.5 32.8 8.03 1124 749 0 oc n 7 / 19/29 9.3 32.7 8.04 1125 755 0 oc n 7 / 19/29 9.3 32.7 8.04 1125 755 0 oc n 7 / 19/29 9.3 32.7 8.04 1125 755 0 oc n 7 / 19/29 9.3 32.7 8.04 1125 755 0 oc n 7 / 19/29 10.5 32.8 8.03 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 755 0 oc p 7 / 19/29 10.5 32.8 8.03 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.7 8.04 1125 757 100 r p 7 / 12/29 9.3 32.8 8.06 1125 757 100 r p 7 / 12/29 9.3 32.8 8.06 1126 777 100 r p 7 / 12/29 |         |        |           |    |     | 6/20/20  | 15.6  |      |      | 27                                   |
| 120 726 0 oc p 7/9/29 7.2 33.0 7.98 1 120 727 50 r n 7/9/29 2.2 33.1 7.90 1 120 730 50 oc p 7/9/29 2.2 33.1 7.90 1 121 732 0 c n 7/11/29 7.5 32.9 7.98 1 121 733 50 r n 7/11/29 7.5 32.9 7.98 1 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 736 50 r n 7/11/29 3.6 33.1 7.92 1 121 736 50 r n 7/11/29 3.6 33.1 7.92 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r n 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 2.1 33.2 7.86 1 122 740 100 r n 7/13/29 2.4 33.1 7.90 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 3.0 33.4 7.79 2 123 746 100 oc n 7/15/29 3.0 33.4 7.79 2 123 746 100 oc n 7/15/29 3.0 32.7 8.04 1 124 752 0 r p 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 5.5 32.8 7.98 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 757 100 c p 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 7.98 1 125 759 50 oc p 7/19/29 5.5 32.8 7.98 1 127 772 100 r p 7/19/29 10.5 32.8 8.03 1 125 757 50 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 1.8 33.1 8.11 1 128 775 100 r p 7/25/29 11.8 33.1 8.11 1 128 775 0 oc p 7/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 777 50 oc n 9/4/29 16.2 33.4 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 13.8 34.1 8.30 1 144 887 0 r p 10/5/29 13.8 34.1 8.30 1 144 887 0 r p 10/1/29 33.3 35.0 8.37   |         |        |           |    |     | 7/1/20   | (18.3 |      |      | 4)                                   |
| 120 726 0 oc p 7/9/29 7.2 33.0 7.98 1 120 727 50 r n 7/9/29 2.2 33.1 7.90 1 120 730 50 oc p 7/9/29 2.2 33.1 7.90 1 121 732 0 c n 7/11/29 7.5 32.9 7.98 1 121 733 50 r n 7/11/29 7.5 32.9 7.98 1 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 736 50 r n 7/11/29 3.6 33.1 7.92 1 121 736 50 r n 7/11/29 3.6 33.1 7.92 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r n 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 2.1 33.2 7.86 1 122 740 100 r n 7/13/29 2.4 33.1 7.90 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 3.0 33.4 7.79 2 123 746 100 oc n 7/15/29 3.0 33.4 7.79 2 123 746 100 oc n 7/15/29 3.0 32.7 8.04 1 124 752 0 r p 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 5.5 32.8 7.98 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 757 100 c p 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 7.98 1 125 759 50 oc p 7/19/29 5.5 32.8 7.98 1 127 772 100 r p 7/19/29 10.5 32.8 8.03 1 125 757 50 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 1.8 33.1 8.11 1 128 775 100 r p 7/25/29 11.8 33.1 8.11 1 128 775 0 oc p 7/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 777 50 oc n 9/4/29 16.2 33.4 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 13.8 34.1 8.30 1 144 887 0 r p 10/5/29 13.8 34.1 8.30 1 144 887 0 r p 10/1/29 33.3 35.0 8.37   |         |        |           |    |     | 7/1/20   | 10.6  |      |      | 23                                   |
| 120 727 50 r n 7/9/29 2.2 33.1 7.90 1 120 730 50 oc p 7/9/29 7.2 33.0 7.98 1 121 732 0 c n 7/11/29 7.5 32.9 7.98 1 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 734 100 r n 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 2.1 33.2 7.86 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 734 0 0 c p 7/13/29 8.2 32.8 7.98 1 122 740 0 0 c p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 747 0 oc p 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 752 0 r p 7/15/29 8.1 32.8 8.03 1 125 755 0 oc n 7/15/29 8.1 32.8 8.03 1 124 752 0 r p 7/15/29 8.1 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 50 oc p 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 8.03 1 125 759 50 oc p 7/19/29 5.5 32.8 8.03 1 125 759 50 oc p 7/19/29 5.5 32.8 8.03 1 125 757 100 r p 7/19/29 5.5 32.8 8.03 1 125 758 0 oc p 7/19/29 5.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 9 7/25/29 11.8 33.1 8.11 1 128 775 100 r p 9 7/25/29 11.8 33.1 8.11 1 128 775 100 r p 9 7/25/29 11.8 33.1 8.11 1 130 787 0 oc n 9/4/29 16.6 33.4 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 141 869 50 r p 10/5/29 24.8 35.3 8.34 1 142 874 100 r n 10/7/29 16.6 34.4 8.27 1 143 883 100 oc n 10/9/29 13.8 34.1 8.30 1 144 887 0 r p 10/5/29 24.8 35.3 35.0 8.37   |         |        |           |    |     | 7/0/20   |       |      |      | 137                                  |
| 120 729 0 r p 7/9/29 7.2 33.0 7.98 1 120 730 50 oc p 7/9/29 2.2 33.1 7.90 121 732 0 c n 7/11/29 7.5 32.9 7.98 1 121 733 50 r n 7/11/29 3.6 33.1 7.92 1 121 734 100 r n 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r n 7/11/29 3.6 33.1 7.92 1 121 738 0 c n 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 3.6 33.1 7.92 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 2.4 33.1 7.90 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 746 50 oc n 7/15/29 4.4 32.9 7.94 1 123 746 100 oc n 7/15/29 4.4 32.9 7.94 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 9.3 32.7 8.04 1 124 749 0 oc n 7/17/29 9.3 32.7 8.04 1 124 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 125 755 0 oc n 7/19/29 5.5 32.8 7.98 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/25/29 11.8 33.1 8.11 128 777 10 0 0c p 7/25/29 11.8 33.1 8.11 128 777 10 0 0c p 7/25/29 11.8 33.1 8.11 128 777 10 0 0c p 7/25/29 11.8 33.1 8.11 128 777 10 0 0c n 9/4/29 16.6 34.4 8.27 144 887 0 r p 10/5/29 24.8 35.3 8.34 141 869 50 r p 10/5/29 24.8 35.3 8.34 141 869 50 r p 10/5/29 24.8 35.3 8.34 142 874 100 r n n 10/9/29 13.8 34.1 8.30 144 887 0 r p 10/1/29 23.3 35.0 8.37  |         | 720    |           |    |     | 7/0/20   | 1.4   |      |      | 177                                  |
| 120 730 50 oc p 7/9/29 2.2 33.1 7.90 1 121 732 0 c n 7/11/29 7.5 32.9 7.98 1 121 733 50 r n 7/11/29 3.6 33.1 7.92 1 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 734 100 r n 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 2.1 33.2 7.86 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 125 755 0 oc n 7/19/29 5.5 32.8 8.03 1 125 755 50 oc n 7/19/29 5.5 32.8 8.03 1 125 755 50 oc n 7/19/29 5.5 32.8 8.03 1 125 755 0 oc n 7/19/29 5.5 32.8 8.03 1 125 756 50 oc n 7/19/29 5.5 32.8 8.03 1 125 757 100 c n 7/19/29 5.5 32.8 8.03 1 125 758 0 oc p 7/19/29 5.5 32.8 8.03 1 125 759 50 oc p 7/19/29 5.5 32.8 8.03 1 125 759 50 oc n 7/19/29 5.5 32.8 8.03 1 125 759 50 oc n 7/19/29 5.5 32.8 8.03 1 125 759 50 oc n 7/19/29 5.5 32.8 8.03 1 125 757 100 r p 7/25/29 11.8 33.1 8.11 1 128 775 100 r p 7/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 9/25/29 11.8 33.1 8.11 1 128 775 100 r p 10/5/29 24.8 35.3 8.34 1 141 870 50 r p 10/5/29 24.8 35.3 8.34 1 141 870 50 r p 10/5/29 24.8 35.3 8.34 1 141 870 50 r p 10/5/29 24.8 35.3 8.34 1 142 874 100 r n n 10/7/29 16.6 34.4 8.27 1 143 883 100 oc n n 10/9/29 13.8 34.1 8.30 1   |         | 720    |           |    |     | 7/ 9/29  | 7.2   | 33.1 |      | 137                                  |
| 121 732 0 c n 7/11/29 7.5 32.9 7.98 1 121 733 50 r n n 7/11/29 7.5 32.9 7.98 1 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 734 100 r n n 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 2.1 33.2 7.86 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 4.4 32.9 7.94 1 123 746 100 oc n 7/15/29 3.0 33.4 7.79 2 123 747 0 oc p 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 7.98 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 7/23/29 8.2 32.9 7.90 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc n 7/19/29 10.5 32.8 8.03 1 125 759 50 oc n 7/19/29 10.5 32.8 8.03 1 126 777 50 oc n 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 9/25/29 11.8 33.1 8.11 128 774 50 oc p 7/19/29 5.5 32.8 7.98 1 129 774 50 oc n 9/19/29 5.5 32.8 7.98 1 120 774 50 oc n 9/19/29 10.5 33.4 8.34 11 128 775 100 r p 9/25/29 11.8 33.1 8.11 128 774 50 oc n 9/19/29 10.5 33.8 8.03 1 127 772 100 r p 9/25/29 11.8 33.1 8.11 128 775 100 r p 9/25/29 11.8 33.1 8.11 128 774 50 oc n 9/19/29 16.6 34.4 8.34 131 795 or n 10/5/29 24.8 35.3 8.34 141 8.70 50 r p 10/11/29 23.3 35.0 8.37  |         |        |           |    |     | 7/ 9/29  | 1.2   | 33.0 |      |                                      |
| 121 733 50 r n 7/11/29 3.6 33.1 7.92 1 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 736 50 r p 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 747 0 oc p 7/15/29 3.0 33.4 7.79 2 123 747 0 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 752 0 r p 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 757 100 r p 9/25/29 11.8 33.1 8.11 1 128 777 50 oc p 7/25/29 11.8 33.1 8.11 1 128 777 50 oc p 7/25/29 11.8 33.1 8.11 1 128 777 50 oc p 7/25/29 11.8 33.1 8.11 1 128 777 50 oc p 7/25/29 11.8 33.1 8.11 1 128 777 50 oc p 7/25/29 11.8 33.1 8.11 1 128 777 50 oc p 7/25/29 11.8 33.1 8.11 1 128 777 50 oc n 9/4/29 16.2 33.4 8.34 1 141 870 50 r p 10/5/29 24.8 35.3 8.34 1 141 870 50 r p 10/5/29 24.8 35.3 8.34 1 142 874 100 r n 10/7/29 16.6 34.4 8.37 1 143 883 100 oc n 10/9/29 13.8 34.1 8.30 1 144 887 0 r p 10/11/29 23.3 35.0 8.37  |         | 730    |           |    |     | 7/ 9/29  | 2.2   | 33.1 |      | 177                                  |
| 121 735 0 oc p 7/11/29 7.5 32.9 7.98 1 121 734 100 r n 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 123 747 0 oc p 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 752 0 r p 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc n 7/19/29 10.5 32.8 8.03 1 125 759 50 oc n 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 125 759 50 oc p 7/19/29 10.5 32.8 8.03 1 126 777 50 oc p 7/19/29 10.5 32.8 8.03 1 127 772 100 r p 9/6/29 24.8 35.3 3.1 8.11 128 777 50 oc p 7/25/29 11.8 33.1 8.11 128 777 50 oc n 9/25/29 11.8 33.1 8.11 128 777 50 oc n 9/25/29 11.8 33.1 8.11 130 787 0 oc n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 10/5/29 24.8 35.3 8.34 141 869 50 r p 10/5/29 24.8 35.3 8.34 141 869 50 r p 10/5/29 24.8 35.3 8.34 141 869 50 r p 10/5/29 24.8 35.3 8.34   |         | 732    |           |    |     | 7/11/29  | 1.0   | 32.9 |      | 141                                  |
| 121 734 100 r n 7/11/29 2.1 33.2 7.86 1 121 736 50 r p 7/11/29 3.6 33.1 7.92 1 121 737 100 r p 7/11/29 2.1 33.2 7.86 1 122 738 0 c n 7/13/29 8.2 32.8 7.98 1 122 740 100 r n 7/13/29 8.2 32.8 7.98 1 122 741 0 oc p 7/13/29 8.2 32.8 7.98 1 123 744 0 oc n 7/15/29 8.1 32.8 8.03 1 123 745 50 oc n 7/15/29 8.1 32.8 8.03 1 123 746 100 oc n 7/15/29 8.1 32.8 8.03 1 124 749 0 oc n 7/15/29 8.1 32.8 8.03 1 124 752 0 r p 7/15/29 9.3 32.7 8.04 1 124 752 0 or n 7/17/29 9.3 32.7 8.04 1 125 755 0 oc n 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 10.5 32.8 8.03 1 125 756 50 oc n 7/19/29 5.5 32.8 7.98 1 125 757 100 c n 7/19/29 5.5 32.8 7.98 1 125 758 0 oc p 7/19/29 5.5 32.8 7.98 1 125 759 50 oc p 7/19/29 5.5 32.8 7.98 1 127 772 100 r p 7/19/29 5.5 32.8 8.03 1 128 774 50 oc p 7/19/29 10.2 32.9 7.90 1 125 758 0 oc p 7/19/29 1.2 32.9 7.90 1 125 758 0 oc p 7/19/29 1.2 32.8 8.03 1 126 777 50 oc p 7/19/29 1.2 32.8 8.03 1 127 772 100 r p 7/19/29 3.2 32.8 8.03 1 128 774 50 oc p 7/19/29 1.8 33.1 8.11 128 775 100 r p 7/25/29 11.8 33.1 8.11 128 775 100 r p 9/25/29 11.8 33.1 8.11 128 777 50 oc p 7/25/29 11.8 33.1 8.11 128 777 50 oc n 9/25/29 11.8 33.1 8.11 130 787 0 oc n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.11 130 787 0 or n 9/25/29 11.8 33.1 8.34 141 870 50 r p 10/5/29 24.8 35.3 8.34 141 870 50 r p 10/5/29 24.8 35.3 8.34 141 887 0 r p 10/5/29 24.8 35.3 8.34 142 874 100 r n 10/7/29 16.6 34.4 8.27 143 883 100 or n 10/7/29 16.6 34.4 8.27 143 883 100 or n 10/9/29 13.8 34.1 8.30   |         |        |           |    |     | 7/11/29  |       |      |      | 159                                  |
| 121       736       50       r       p       7/11/29       3.6       33.1       7.92       1         121       737       100       r       p       7/11/29       2.1       33.2       7.86       1         122       738       0       c       n       7/13/29       8.2       32.8       7.98       1         122       740       100       r       n       7/13/29       8.2       32.8       7.98       1         123       744       0       oc       n       7/15/29       8.1       32.8       8.03       1         123       745       50       oc       n       7/15/29       4.4       32.9       7.94       1         123       746       100       oc       n       7/15/29       3.0       33.4       7.79       2         123       747       0       oc       p       7/15/29       9.3       32.7       8.04       1         124       749       0       oc       n       7/17/29       9.3       32.7       8.04       1         125       755       0       oc       n       7/19/29       9.3       32.7 <td></td> <td></td> <td></td> <td></td> <td></td> <td>7/11/29</td> <td>7.5</td> <td>32.9</td> <td>7.98</td> <td>141</td>  |         |        |           |    |     | 7/11/29  | 7.5   | 32.9 | 7.98 | 141                                  |
| 121       737       100       r       p       7/11/29       2.1       33.2       7.86       1         122       738       0       c       n       7/13/29       8.2       32.8       7.98       1         122       741       0       oc       p       7/13/29       8.2       32.8       7.98       1         123       744       0       oc       n       7/15/29       8.1       32.8       8.03       1         123       745       50       oc       n       7/15/29       8.1       32.8       8.03       1         123       746       100       oc       n       7/15/29       8.1       32.8       8.03       1         123       747       0       oc       p       7/15/29       8.1       32.8       8.03       1         124       749       0       oc       n       7/17/29       9.3       32.7       8.04       1         124       749       0       oc       n       7/17/29       9.3       32.7       8.04       1         124       752       0       r       p       7/17/29       9.3       32.7   |         | 734    |           |    |     | 7/11/29  | 2.1   | 33.2 | 7.80 | 184                                  |
| 122       738       0       c       n       7/13/29       8.2       32.8       7.98       1         122       740       100       r       n       7/13/29       8.2       32.8       7.98       1         122       741       0       oc       p       7/13/29       8.2       32.8       7.98       1         123       744       0       oc       n       7/15/29       8.1       32.8       8.03       1         123       745       50       oc       n       7/15/29       3.0       33.4       7.79       2         123       746       100       oc       n       7/15/29       3.0       33.4       7.79       2         123       747       0       oc       p       7/15/29       8.1       32.8       8.03       1         124       749       0       oc       n       7/17/29       9.3       32.7       8.04       1         125       755       0       oc       n       7/19/29       9.3       32.7       8.04       1         125       756       50       oc       n       7/19/29       5.5       32.8 <td></td> <td>736</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>33.1</td> <td></td> <td>159</td>   |         | 736    |           |    |     |          |       | 33.1 |      | 159                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         | 737    |           |    |     | 7/11/29  |       |      |      | 184                                  |
| 122       741       0       oc       p       7/13/29       8.2       32.8       7.98       1         123       744       0       oc       n       7/15/29       8.1       32.8       8.03       1         123       745       50       oc       n       7/15/29       4.4       32.9       7.94       1         123       746       100       oc       n       7/15/29       3.0       33.4       7.79       2         123       747       0       oc       p       7/15/29       8.1       32.8       8.03       1         124       749       0       oc       n       7/17/29       9.3       32.7       8.04       1         124       752       0       r       p       7/17/29       9.3       32.7       8.04       1         125       755       0       oc       n       7/19/29       10.5       32.8       8.03       1         125       756       50       oc       n       7/19/29       10.5       32.8       8.03       1         125       757       100       c       n       7/19/29       4.2       32.9<  |         |        |           |    |     |          |       |      |      | 130                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   | 122     |        | 100       |    |     | 7/13/29  |       | 33.1 |      | 161                                  |
| 123  | 122     | 741    |           |    |     | 7/13/29  |       | 32.8 |      | 130                                  |
| 123       746       100       oc       n       7/15/29       3.0       33.4       7.79       2         123       747       0       oc       p       7/15/29       8.1       32.8       8.03       1         124       749       0       oc       n       7/17/29       9.3       32.7       8.04       1         124       752       0       r       p       7/17/29       9.3       32.7       8.04       1         125       755       0       oc       n       7/19/29       10.5       32.8       8.03       1         125       756       50       oc       n       7/19/29       5.5       32.8       7.98       1         125       757       100       c       n       7/19/29       4.2       32.9       7.90       1         125       758       0       oc       p       7/19/29       10.5       32.8       8.03       1         125       758       0       oc       p       7/19/29       10.5       32.8       8.03       1         125       759       50       oc       p       7/19/29       5.5       32.8  |         |        |           |    |     | 7/15/29  |       |      |      | 113                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   | 123     |        |           |    |     |          |       |      | 7.94 | 150                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |           |    |     | 7/15/29  |       | 33.4 | 7.79 | 209                                  |
| 125  |         |        |           |    |     | 7/15/29  | 8.1   | 32.8 |      | 113                                  |
| 125  |         |        |           |    |     | 7/17/29  | 9.3   | 32.7 |      | 103                                  |
| 125  |         |        |           |    |     | 7/17/29  | 9.3   | 32.7 |      | 103                                  |
| 125  |         |        |           |    |     | 7/19/29  |       | 32.8 |      | 125                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |           |    |     | 7/19/29  |       |      |      | 138                                  |
| 125     759     50     oc     p     7/19/29     5.5     32.8     7.98     1       127     772     100     r     p     7/23/29     8.2     32.8     8.00       128     774     50     oc     p     7/25/29     11.8     33.1     8.11       128     775     100     r     p     7/25/29     10.2     33.2     8.06       128     777     50     oc     p     7/25/29     11.8     33.1     8.11       130     787     0     oc     n     9/4/29     16.2     33.4     8.34       131     795     0     r     p     9/6/29     19.3     33.4     8.34       141     869     50     r     p     10/5/29     24.8     35.3     8.34       141     870     50     r     p     10/5/29     24.8     35.3     8.34       142     874     100     r     n     10/7/29     16.6     34.4     8.27       143     883     100     oc     n     10/9/29     13.8     34.1     8.30       144     887     0     r     p     10/11/29     23.3     35.0     8.37   |         |        |           |    |     |          | 4.2   |      |      | 175                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         | 758    |           |    |     | 7/19/29  | 10.5  | 32.8 | 8.03 | 125                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         | 759    |           |    |     | 7/19/29  | 5.5   | 32.8 | 7.98 | 138                                  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |           |    |     | 7/23/29  | 8.2   |      |      | 72                                   |
| 128     775     100     r     p     7/25/29     10.2     33.2     8.06       128     777     50     oc     p     7/25/29     11.8     33.1     8.11       130     787     0     oc     n     9/4/29     16.2     33.4     8.34       131     795     0     r     p     9/6/29     19.3     33.4     8.34       141     869     50     r     p     10/5/29     24.8     35.3     8.34       141     870     50     r     p     10/5/29     24.8     35.3     8.34       142     874     100     r     n     10/7/29     16.6     34.4     8.27       143     883     100     oc     n     10/9/29     13.8     34.1     8.30       144     887     0     r     p     10/11/29     23.3     35.0     8.37  |         | 774    |           |    | p   | 7/25/29  |       |      |      | 29                                   |
| 130 787 0 oc n 9/4/29 16.2 33.4 8.34 131 795 0 r p 9/6/29 19.3 33.4 8.34 141 869 50 r p 10/5/29 24.8 35.3 8.34 141 870 50 r p 10/5/29 24.8 35.3 8.34 142 874 100 r n 10/7/29 16.6 34.4 8.27 143 883 100 oc n 10/9/29 13.8 34.1 8.30 144 887 0 r p 10/11/29 23.3 35.0 8.37  |         | 775    |           |    | p * | 7/25/29  |       |      |      | 46                                   |
| 130     787     0     oc     n     9/4/29     16.2     33.4     8.34       131     795     0     r     p     9/6/29     19.3     33.4     8.34       141     869     50     r     p     10/5/29     24.8     35.3     8.34       141     870     50     r     p     10/5/29     24.8     35.3     8.34       142     874     100     r     n     10/7/29     16.6     34.4     8.27       143     883     100     oc     n     10/9/29     13.8     34.1     8.30       144     887     0     r     p     10/11/29     23.3     35.0     8.37  |         | 777    |           |    | p   | 7/25/29  |       |      |      | 29                                   |
| 141     869     50     r     p     10/5/29     24.8     35.3     8.34       141     870     50     r     p     10/5/29     24.8     35.3     8.34       142     874     100     r     n     10/7/29     16.6     34.4     8.27       143     883     100     oc     n     10/9/29     13.8     34.1     8.30       144     887     0     r     p     10/11/29     23.3     35.0     8.37   |         | 787    |           |    | n   | 9/ 4/29  | 16.2  |      |      | 36                                   |
| 141     869     50     r     p     10/5/29     24.8     35.3     8.34       141     870     50     r     p     10/5/29     24.8     35.3     8.34       142     874     100     r     n     10/7/29     16.6     34.4     8.27       143     883     100     oc     n     10/9/29     13.8     34.1     8.30       144     887     0     r     p     10/11/29     23.3     35.0     8.37   | 131     |        |           | r  | p   | 9/ 6/29  | 19.3  |      |      |                                      |
| 141     870     50     r     p     10/5/29     24.8     35.3     8.34       142     874     100     r     n     10/7/29     16.6     34.4     8.27       143     883     100     oc     n     10/9/29     13.8     34.1     8.30       144     887     0     r     p     10/11/29     23.3     35.0     8.37   | 141     |        | 50        | r  | р   | 10/ 5/29 | 24.8  |      |      | 5<br>5                               |
| 143 883 100 oc n 10/9/29 13.8 34.1 8.30<br>144 887 0 r p 10/11/29 23.3 35.0 8.37   |         | 870    | 50        |    |     | 10/ 5/29 | 24.8  |      |      | 5                                    |
| 143 883 100 oc n 10/9/29 13.8 34.1 8.30<br>144 887 0 r p 10/11/29 23.3 35.0 8.37   | 142     | 874    | 100       |    |     | 10/ 7/29 |       |      |      | 7                                    |
| 144 887 0 r p 10/11/29 23.3 35.0 8.37  |         | 883    |           |    |     | 10/ 9/29 | 13.8  | 34.1 | 8.30 | 10                                   |
|  |         | 887    |           |    |     | 10/11/29 |       |      |      | 6                                    |
| 144 009 100 F D 10/11/29 10.0 34.0 8.37  | 144     | 889    | 100       | r  | p   | 10/11/29 | 16.6  | 34.5 | 8.37 | 6                                    |
| 10,00,00   |         |        |           |    |     |          |       |      |      |                                      |

Table 22. Distributional and environmental records for Ceratium tripos subsp. atlanticum

| Station | Sample   | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|----------|-----------|-----------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------------------------|
| 1       | 1        | 0         | oc                    | n              | 5/12/28            | 24.0                | 36.2               | 8.16         | 34                                   |
| l<br>la | 3        | 70        | oc                    | n<br>n         | 5/12/28<br>5/18/28 |                     | 36.4<br>36.3       | 8.15<br>8.20 | 36)<br>46)                           |
| 1b<br>2 | 7<br>12  | 50<br>50  | c<br>oc               | n<br>n         | 5/18/28<br>5/18/28 | (21.7<br>20.5       | 36.3<br>36.4       | 8.20<br>8.21 | 38)<br>46                            |
| 2 2     | 13<br>14 | 100       | c                     | n<br>n         | 5/18/28<br>5/18/28 | 19.8<br>20.5        | 36.4<br>36.4       | 8.21<br>8.23 | 46<br>58                             |
| 2       | 15<br>17 | 0         | r<br>oc               | n<br>n         | 5/18/28<br>5/21/28 | 20.5<br>15.5        | 36.4<br>36.1       | 8.23<br>8.15 | 58<br>99                             |

Table 22. Distributional and environmental records for Ceratium tripos subsp. atlanticum--Continued

| Station     | Sample       | Depth          | Relative                       | Appa-  | Date                 | Temperature (°C) | Salinity     | pН           | PO4               |
|-------------|--------------|----------------|--------------------------------|--------|----------------------|------------------|--------------|--------------|-------------------|
| 2           | 10           | (m)            | abundance                      | ratus  | E /01 /00            |                  | (0/00)       | 0.10         | mg/m <sup>3</sup> |
| 3<br>4      | 19<br>23     | 100<br>100     | r                              | n<br>n | 5/21/28<br>5/23/28   | 13.6<br>13.4     | 35.9<br>35.9 | 8.10<br>8.12 | 48<br>50          |
| 4           | 24           | 50<br>0        | r                              | n      | 5/23/28              | 14.4             | 36.0         | 8.15         | 21                |
| 5a<br>5a    | 33<br>34     | 0              | c<br>r                         | n<br>n | 5/31/28<br>5/31/28   | $(12.4 \\ 12.4$  | 35.6<br>35.6 | 8.15<br>8.15 | 21)<br>21         |
| 6           | 35           | 0              | c                              | n      | 5/31/28              | 12.4             | 35.6         | 8.15         | 21                |
| 6<br>6      | 36<br>37     | 50<br>100      | c<br>c                         | n<br>n | 5/31/28<br>5/31/28   | 11.6<br>11.3     | 35.6<br>35.6 | 8.12<br>8.08 | 32<br>41          |
| 6a          | 40           | 0              | r                              | n      | 5/31/28              | (12.4            | 35.6         | 8.15         | 21)               |
| 6a<br>6b    | 42<br>43     | 0              | c<br>c                         | n<br>n | 6/ 2/28<br>6/ 2/28   | (12.4<br>(12.4   | 35.6<br>35.6 | 8.15<br>8.15 | 21)<br>21)        |
| 6b          | 40           | 0              | С                              | n      | 6/ 2/28              | (12.4            | 35.6         | 8.15         | 21)               |
| 6b<br>6b    | 45<br>46     | 0              | . c                            | n<br>n | 6/ 2/28              | (12.4<br>(12.4   | 35.6<br>35.6 | 8.15<br>8.15 | 21)<br>21)        |
| 6c          | 47           | 100            | С                              | n      | 6/ 2/28              | (11.3            | 35.6         | 8.08         | 41)               |
| 6c<br>6c    | 48<br>49     | 0              | c<br>c                         | n<br>n | 6/ 2/28<br>6/ 4/28   | (12.4<br>(12.4   | 35.6<br>35.6 | 8.15<br>8.15 | 21)<br>21)        |
| 6e          | 52           | . 0            | r                              | n      | 7/ 8/28              | (10.6            | 35.4         | 8.11         | 28)               |
| 6f<br>6g    | 53<br>5⁴     | 0              | c<br>c                         | n<br>n | 7/ 9/28<br>7/10/28   | (10.6<br>(10.6   | 35.4<br>35.4 | 8.11<br>8.11 | 28)<br>28)        |
| 6h          | 55           | 0              | oc                             | n      | 7/11/28              | (10.6            | 35.4         | 8.11<br>8.08 | 28)               |
| 7           | 56<br>57     | 50             | oc<br>oc                       | n<br>n | 7/11/28<br>7/11/28   | 8.9<br>8.2       | 35.2<br>35.2 | 8.03         | 3 <b>4</b><br>47  |
| 7 8         | 58<br>59     | 100            | oc                             | n<br>n | 7/11/28<br>7/15/28   | 8.1<br>10.3      | 35.2<br>35.2 | 8.04<br>7.93 | 57<br>13          |
| 8           | 60           | 50             | c<br>c                         | n      | 7/15/28              | 9.1              | 35.2         | 7.95         | 27                |
| 8           | 61<br>64     | 100            | oc<br>a                        | n<br>n | 7/15/28 7/28/28      | 8.4<br>11.2      | 35.3<br>35.1 | 7.95<br>8.08 | 54<br>20          |
| 8<br>9<br>9 | 65           | 50             | a                              | n      | 7/28/28              | 8.4              | 35.1         | 7.96         | 55                |
| 9           | 66<br>67     | 100            | c                              | n<br>n | 7/28/28<br>7/28/28   | 7.6<br>11.2      | 35.1<br>35.1 | 7.98<br>8.08 | 56<br>20          |
| 10          | 68           | 0              | a                              | n      | 7/30/28              | 10.9             | 34.9         | 8.08         | 28                |
| 10<br>10    | 69<br>70     | 50<br>100      | c<br>oc                        | n<br>n | 7/30/28 7/30/28      | 10.0<br>6.6      | 34.9<br>35.0 | 8.04<br>7.95 | 34<br>52          |
| 11          | 73           | 0              | oc                             | n      | 8/ 1/28              | 10.7             | 34.9         | 8.06         | 27                |
| 11<br>11    | 74<br>75     | <b>50</b><br>0 | oc oc                          | n<br>p | 8/ 1/28<br>8/ 1/28   | 7.3<br>10.7      | 34.9<br>34.9 | 7.92<br>8.06 | 63<br>27          |
| 11'         | 77           | 100            | r                              | p      | 8/ 1/28              | 6.3              | 35.1<br>34.9 | 7.90<br>8.06 | 66<br>27)         |
| 11a<br>14   | 78<br>90     | 0              | oc<br>oc                       | n<br>n | 8/ 1/28<br>8/ 9/28   | (10.7<br>21.2    | 35.2         | 8.18         | 27                |
| 14<br>14    | 91<br>93     | 100            | oc<br>c                        | p<br>p | 8/ 9/28<br>8/ 9/28   | 14.0<br>21.2     | 35.6<br>35.2 | 8.06<br>8.18 | 34<br>34          |
| 16          | 106          | 0              | ос                             | n      | 8/13/28              | 25.9             | 36.2         | 8.24         | 8                 |
| 16<br>25    | 107<br>157   | 50<br>0        | c<br>r                         | n<br>p | 8/13/28<br>9/ 3/28   | 24.4<br>27.5     | 36.4<br>35.6 | 8.23<br>8.31 | 8<br>5<br>3<br>3  |
| 30          | 186          | 50             | r                              | p      | 9/15/28              | 27.8             | 36.1         | 8.29         | 3                 |
| 30<br>32    | 189<br>194   | 50<br>0        | r<br>oc                        | n<br>n | 9/15/28<br>10/ 5/28  | 27.8<br>28.0     | 36.1<br>36.0 | 8.29<br>8.23 | 2                 |
| 32<br>33    | 196A<br>198A | 100<br>50      | r<br>oc                        | p      | 10/ 5/28<br>10/ 8/28 | 22.2<br>28.2     | 36.4<br>36.2 | 8.10<br>8.24 | 30<br>4           |
| 37          | 217          | 0              | oc                             | p<br>n | 11/ 1/28             | 27.1             | 31.7         | 8.28         | 15                |
| 37<br>37    | 218<br>220   | 50<br>0        | oc<br>oc                       | n<br>p | 11/ 1/28<br>11/ 1/28 | 18.8<br>27.1     | 34.5<br>31.7 | 8.00<br>8.28 | 121<br>15         |
| 39          | 225          | 0              | r                              | n      | 11/ 1/28             | 24.8             | 33.0         | 8.24         | 16                |
| 39<br>39    | 226<br>227   | 50<br>100      | $rac{\mathbf{r}}{\mathbf{r}}$ | n<br>n | 11/ 6/28<br>11/ 6/28 | 16.3<br>14.0     | 34.6<br>35.0 | 7.92<br>7.88 | .48<br>181        |
| 41          | 235          | 0              | r                              | n      | 11/10/28             | 20.4             | 34.2         | 8.11         | 32                |
| 42<br>42    | 241<br>242   | 0<br>50        | r<br>r                         | n<br>n | 11/13/28<br>11/13/28 | 18.7<br>17.2     | 34.7<br>34.9 | 8.06<br>7.99 | 45<br>68          |
| 43<br>43    | 246<br>247   | 100            | r                              | n<br>p | 11/15/28<br>11/15/28 | 13.6<br>19.6     | 35.0<br>34.8 | 7.90         | 92<br>52          |
| 44          | 253          | 0              | r                              | p      | 11/17/28             | 20.7             | 34.9         | 8.03         | 38                |
| 45<br>45    | 256<br>258   | 0<br>100       | oc<br>oc                       | n<br>n | 11/19/28<br>11/19/28 | 22.4<br>18.6     | 35.3<br>35.1 | 8.12<br>8.00 | 38<br>50          |
| 60          | 354          | 0              | c                              | n      | 12/26/28             | 15.0             | 34.0         | 8.07         | 50                |
| 60<br>60    | 355<br>356   | 50<br>100      | oc<br>oc                       | n<br>n | 12/26/28<br>12/26/28 | 13.4<br>10.6     | 34.0<br>34.0 | 8.06<br>8.03 | 34<br>62          |
| 60<br>60-61 | 357<br>360   | 0              | · oc                           | p      | 12/26/28<br>12/26/28 | 15.0<br>(15.0    | 34.0<br>34.0 | 8.07<br>8.07 | 50<br>50)         |
| 60-61       | 361          | 0              | c<br>oc                        | n<br>n | 12/26/28             | (15.0            | 34.0         | 8.07         | 50)               |
| 60-61<br>61 | 362<br>363   | 0              | c<br>a                         | n<br>n | 12/26/28<br>12/28/28 | (15.0<br>16.9    | 34.0<br>34.0 | 8.07<br>8.05 | 50)<br>46         |
| 61          | 364          | 50             | c                              | n      | 12/28/28             | 14.0             | 34.0         | 8.05         | 60                |
| 61<br>61    | 365<br>366   | 100            | oc<br>a                        | n<br>p | 12/28/28<br>12/28/28 | 10.8<br>16.9     | 34.0<br>34.0 | 8.03<br>8.05 | 80<br>46          |
| 61          | 367          | 50             | ç                              | p      | 12/28/28             | 14.0             | 34.0         | 8.05         | 60<br>80          |
| 61          | 368          | 100            | С                              | p      | 12/28/28             | 10.8             | 34.0         | 8.03         | 00                |

Table 22. Distributional and environmental records for Ceratium tripos subsp. atlanticum -- Concluded

| Station      | Sample       | Depth (m)  | Relative abundance | Appa-  |                      | Temperature<br>(°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub> mg/m <sup>3</sup>              |
|--------------|--------------|------------|--------------------|--------|----------------------|---------------------|--------------------|--------------|--|
| 61-62<br>62  | 369<br>371   | 0          | c<br>c             | n      | 12/28/28             | (16.9               | 34.0               | 8.05         | 46)  |
| 62           | 372          | 50         | c                  | n<br>n | 12/30/28<br>12/30/28 | 19.2<br>16.2        | 34.2<br>34.3       | 8.12<br>8.10 | 32<br>28                                       |
| 62           | 373          | 100        | С                  | n      | 12/30/28             | 13.1                | 34.2               | 8.06         | 48   |
| 62<br>62-63  | 375<br>378   | 50<br>0    | oc<br>r            | p<br>n | 12/30/28 1/ 1/29     | 16.2<br>(16.2       | 34.3               | 8.10         | 28   |
| 63-64        | 391          | ő          | r                  | n      | 1/ 1/29              | (20.5               | 34.3<br>34.6       | 8.10<br>8.07 | 28)<br>21)                                     |
| 73           | 450          | 0          | c                  | n      | 2/10/29              | 25.3                | 35.4               | 8.21         | 44   |
| 73<br>73     | 451<br>452   | 50<br>100  | oc<br>oc           | n<br>n | 2/10/29<br>2/10/29   | $\frac{18.7}{14.7}$ | 35.4<br>35.0       | 8.05<br>7.80 | 122<br>178                                     |
| 73           | 453          | 0          | oc                 | p      | 2/10/29              | 25.3                | 35.4               | 8.21         | 44   |
| 74<br>79     | 457<br>481   | 50<br>0    | r                  | n      | 2/12/29<br>2/22/29   | 19.2                | 35.4               | 8.06         | 80   |
| 79           | 482          | 50         | r<br>oc            | n<br>n | 2/22/29              | 25.2<br>24.5        | 36.0<br>36.1       | 8.17<br>8.17 | 34<br>34                                       |
| 114          | 688          | 100        | r                  | p      | 6/27/29              | 13.0                | 34.5               | 8.00         | 91   |
| 114<br>114   | 690<br>691   | 50<br>100  | oc<br>r            | p<br>n | 6/27/29<br>6/27/29   | 16.2<br>13.0        | 34.6<br>34.5       | 8.04         | 63<br>91                                       |
| 115          | 692          | 0          | oc                 | n      | 6/29/29              | 20.6                | 34.6               | 8.19         | 4  |
| 115<br>115a  | 695-6<br>699 | 0          | oc<br>a            | p<br>n | 6/29/29<br>7/ 1/29   | 20.6<br>(18.3       | 34.6<br>34.3       | 8.19         | 4  |
| 115a         | 700          | 0          | a                  | n      | 7/ 1/29              | (18.3               | 34.3               | 8.18<br>8.18 | 4)<br>4)                                       |
| 115a<br>115a | 702          | 0          | oc                 | n      | 7/ 1/29              | 18.3                | 34.3               | 8.18         | 4  |
| 116          | 705<br>703   | 50         | oc<br>c            | p<br>n | 7/ 1/29<br>7/ 1/29   | 18.3<br>10.6        | 34.3<br>33.8       | 8.18<br>8.11 | 4<br>23  |
| 116          | 704          | 100        | С                  | n      | 7/ 1/29              | 6.7                 | 33.8               |              | ***  |
| 116<br>116   | 706<br>707   | 100<br>100 | c<br>r             | n<br>p | 7/ 1/29<br>7/ 1/29   | 10.6<br>6.7         | 33.8<br>33.8       | 8.11         | 23   |
| 117          | 708          | 0          | oc                 | n      | 7/ 3/29              | 15.9                | 34.3               | 8.17         | 3  |
| 117<br>117   | 710<br>711   | 100<br>0   | oc<br>oc           | n      | 7/ 3/29<br>7/ 3/29   | 8.8<br>15.9         | 34.1<br>34.3       | 7.98<br>8.17 | 84<br>3  |
| 117          | 712          | 50         | r                  | p<br>p | 7/ 3/29              | 12.5                | 34.2               | 8.06         | 51   |
| 118<br>118   | 716<br>717   | 100        | r                  | n      | 7/ 5/29              | 6.1                 | 33.8               | 7.94         | 114  |
| 119          | 720          | 0          | r                  | p<br>p | 7/ 5/29<br>7/ 7/29   | 10.2<br>6.9         | 33.6<br>33.0       | 8.21<br>7.96 | 90<br>142                                      |
| 126          | 761          | 0          | oc                 | n      | 7/21/29              | 11.2                | 32.6               | 8.09         | 76   |
| 127<br>127   | 767<br>768   | 0<br>50    | oc<br>r            | n<br>n | 7/23/29<br>7/23/29   | 13.4<br>10.5        | 32.7<br>32.8       | 8.12<br>8.09 | 43<br>56                                       |
| 128          | 773          | 0          | c                  | n      | 7/25/29              | 16.4                | 33.0               | 8.12         | 29   |
| 128<br>128   | 774<br>776   | 50<br>0    | r                  | n<br>p | 7/25/29<br>7/25/29   | 11.8<br>16.4        | 33.1<br>33.0       | 8.11<br>8.12 | 29<br>29                                       |
| 128          | 775          | 100        | oc                 | n      | 7/25/29              | 10.2                | 33.2               | 8.06         | 46   |
| 128<br>128   | 777<br>778   | 50<br>100  | r                  | p      | 7/25/29<br>7/25/29   | 11.8<br>10.2        | 33.1<br>33.2       | 8.11<br>8.06 | 29<br>46                                       |
| 128          | 779          | 0          | oc                 | p<br>n | 7/25/29              | 16.4                | 33.0               | 8.12         | 29   |
| 129<br>130   | 780<br>781   | 0          | oc<br>a            | n<br>n | 7/27/29<br>9/ 4/29   | 16.3<br>16.2        | 33.1<br>33.4       | 8.13<br>8.34 | 25<br>26                                       |
| 130          | 782          | 50         | c                  | n      | 9/4/29               | 11.7                | 33.4               | 8.26         | 83   |
| 130<br>130   | 783<br>784   | 100        | С                  | n      | 9/ 4/29              | 8.8                 | 33.7               | 8.06         | 176  |
| 130          | 785          | 50         | c<br>c             | p<br>p | 9/ 4/29<br>9/ 4/29   | 16.2<br>11.7        | 33.4<br>33.4       | 8.34<br>8.26 | 26<br>83                                       |
| 130<br>130   | 786<br>787   | 100        | r                  | p      | 9/ 4/29              | 8.8                 | 33.7               | 8.06         | 176  |
| 131          | 788          | 0          | c<br>r             | n<br>n | 9/ 4/29<br>9/ 6/29   | 16.2<br>19.3        | 33.4<br>33.4       | 8.34<br>8.34 | 36   |
| 131          | 789          | 100        | oc                 | n      | 9/ 6/29              | 12.1                | 33.4               | 8.32         | •••  |
| 131<br>131   | 792<br>793   | 0          | oc<br>r            | p<br>p | 9/ 6/29<br>9/ 6/29   | 19.3<br>19.3        | 33.4<br>33.4       | 8.34<br>8.34 | • • •  |
| 131          | 794          | 0          | r                  | p      | 9/6/29               | 19.3                | 33.4               | 8.34         | • • •  |
| 131<br>132   | 795<br>797   | 0          | r                  | p<br>n | 9/ 6/29<br>9/ 8/29   | 19.3<br>21.0        | 33.4<br>33.9       | 8.34<br>8.34 | 15   |
| 132          | 798          | 50         | oc                 | n      | 9/8/29               | 17.6                | 33.9               | 8.33         | 19   |
| 132<br>132   | 799<br>801   | 100        | oc<br>r            | n<br>p | 9/ 8/29<br>9/ 8/29   | 14.3<br>21.0        | 33.4<br>33.9       | 8.30<br>8.34 | 16<br>15                                       |
| 132          | 802          | 50         | r                  | p      | 9/8/29               | 17.6                | 33.9               | 8.33         | 19   |
| 132<br>143   | 803<br>881   | 100        | oc<br>oc           | p<br>n | 9/ 8/29<br>10/ 9/29  | 14.3<br>22.4        | 33.4<br>34.4       | 8.30         | 16<br>6  |
| 143          | 882          | 50         | oc                 | n      | 10/ 9/29             | 19.0                | 34.2               | 8.34         | 6  |
| 143<br>143   | 883<br>884   | 100        | oc<br>r            | n      | 10/ 9/29<br>10/ 9/29 | 19.0<br>22.4        | 34.2<br>34.4       | 8.34         | 6<br>6<br>6<br>6<br>6<br>6<br>6<br>6<br>6<br>7 |
| 145          | 890          | 0          | c                  | p<br>n | 10/ 9/29             | 19.0                | 34.2               | 8.34         | 6  |
| 145<br>145   | 892<br>893   | 100        | oc                 | n      | 10/ 9/29<br>10/ 9/29 | 16.0                | 34.1<br>34.2       | 8.31<br>8.34 | 6  |
| 145          | 895          | 100        | oc<br>c            | p<br>p | 10/ 9/29             | 19.0<br>16.0        | 34.2               | 8.31         | 6  |
| 146          | 896          | 0          | ос                 | n      | 10/15/29             | 22.4                | 34.9               | 8.37         | 6  |
| 146<br>146   | 897<br>898   | 50<br>100  | oc<br>oc           | n<br>n | 10/15/29<br>10/15/29 | 22.4<br>19.7        | 34.9<br>34.3       | 8.30<br>8.26 | 7  |
| 146          | 901          | 50         | r                  | p      | 10/15/29             | 22.4                | 34.9               | 8.30         | 6  |
| 147          | 905          | 100        | r                  | n      | 10/15/29             | 19.2                | <b>35</b> .0       | 8.29         | 5  |

Table 23. Distributional and environmental records for Ceratium tripos subsp. semipulchellum

| Station     | Sample      | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|-------------|-------------|------------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 1           | 1           | 0          | oc                 | n              | 5/12/28              | 24.0                | 36.2               | 8.16         | 34                                   |
| 1<br>1a     | 2<br>4<br>5 | 70         | r                  | n<br>n         | 5/12/28<br>5/18/28   | (22.4<br>(22.3      | 36.4<br>36.3       | 8.15<br>8.20 | 36<br>46)                            |
| 1a          | 5           | ő          | c                  | n              | 5/18/28              | (22.3               | 36.3               | 8.20         | 46)                                  |
| 1b          | 6           | 0          | c                  | n              | 5/18/28              | (22.3               | 36.3               | 8.20         | 46)                                  |
| 1b<br>1b    | 7<br>8      | 50<br>100  | c                  | n              | 5/18/28<br>5/18/28   | (21.7<br>(20.0      | 36.3<br>36.5       | 8.20<br>8.18 | 38)<br>36)                           |
| 2           | 12          | 50         | oc<br>oc           | n<br>n         | 5/18/28              | 20.5                | 36.4               | 8.21         | 46                                   |
| 14          | 101         | 50         | r                  | n              | 8/ 9/28              | 15.0                | 35.1               | 8.18         | 16                                   |
| 15          | 102         | 100        | r                  | n              | 8/11/28              | 18.4                | 36.4               | 8.20         | 19                                   |
| 16<br>16    | 104<br>107  | 50<br>50   | r                  | p<br>n         | 8/13/28<br>8/13/28   | 24.4<br>24.4        | 36.4<br>36.4       | 8.23<br>8.23 | 8<br>8                               |
| 16          | 108         | 100        | r                  | n              | 8/13/28              | 19.9                | 36.5               | 8.17         | 13                                   |
| 17          | 111         | 0          | r                  | n              | 8/15/28              | 26.2                | 36.6               | 8.29         | 9                                    |
| 17<br>17    | 112<br>113  | 50<br>100  | r                  | n<br>n         | 8/15/28<br>8/15/28   | 21.9<br>19.3        | 36.6<br>36.5       | 8.28<br>8.23 | 12                                   |
| 20          | 125         | 0          | r                  | p              | 8/22/28              | 26.0                | 36.6               | 8.37         | 9<br><b>5</b>                        |
| 20          | 128         | 0          | ос                 | 'n             | 8/22/28              | 26.0                | 36.6               | 8.37         | 5                                    |
| 23          | 145         | 0          | oc                 | p              | 8/29/28              | 27.2                | 35.9               | 8.25         | 4                                    |
| 23<br>23    | 148<br>149  | 0<br>50    | oc<br>oc           | n<br>n         | 8/29/28<br>8/29/28   | 27.2<br>20.9        | 35.9<br>36.0       | 8.25<br>8.14 | 4<br>13                              |
| 23          | 150         | 100        | r                  | n              | 9/29/28              | 16.6                | 36.0               | 8.18         | 75                                   |
| 24          | 151         | 0          | oc                 | р              | 8/31/28              | 27.2                | 35.2               | 8.32         | 4                                    |
| 24<br>24    | 153<br>154  | 100        | r<br>oc            | p              | 8/31/28<br>8/31/28   | 15.6<br>27.2        | 35.6<br>35.2       | 7.96<br>8.32 | 99<br>4                              |
| 24          | 156         | 100        | r                  | n<br>n         | 8/31/28              | 15.6                | 35.6               | 7.96         | 99                                   |
| 25          | 161         | 50         | oc                 | n              | 9/ 3/28              | 21.5                | 36.0               | 8.22         | 12                                   |
| 26<br>27    | 165         | 100        | r                  | p              | 9/ 5/28              | 14.9                | 35.6               | 8.11         | 40                                   |
| 27          | 169<br>172  | 100<br>100 | oc                 | p<br>n         | 9/ 7/28<br>9/ 7/28   | 17.7<br>17.7        | 36.0<br>36.0       | 8.09<br>8.09 | 46<br>46                             |
| 28          | 174         | 50         | r                  | p              | 9/11/28              | 26.7                | 36.3               | 8.26         | 4 4                                  |
| 28          | 177         | 50         | r                  | n              | 9/11/28              | 26.7                | 36.3               | 8.26         |                                      |
| 29<br>29    | 180<br>182  | <b>5</b> 0 | r                  | p<br>n         | 9/13/28<br>9/13/28   | 27.2<br>27.6        | 36.2<br>36.2       | 8.29<br>8.31 | 3<br>3                               |
| 30          | 186         | 50         | oc                 | p              | 9/15/28              | 27.8                | 36.1               | 8.29         | 3                                    |
| 30          | 189         | 50         | c                  | n              | 9/15/28              | 27.8                | 36.1               | 8.29         | 3                                    |
| 30<br>31    | 190<br>191  | 100<br>0   | 00                 | n              | 9/15/28              | 24.1                | 36.4<br>34.4       | 8.10<br>8.27 | 20                                   |
| 31          | 192         | 50         | oc<br>oc           | n<br>n         | 10/ 3/28<br>10/ 3/28 | 28.5<br>28.2        | 35.4               | 8.23         | 2<br>2<br>2                          |
| 32          | 195         | 50         | r                  | n              | 10/ 5/28             | 27.2                | 36.0               | 8.24         |                                      |
| 33          | 198         | 50         | r                  | n              | 10/ 8/28             | 28.2                | 36.2               | 8.24         | 4                                    |
| 33<br>34    | 199A<br>201 | 100<br>100 | oc                 | p<br>n         | 10/ 8/28<br>10/ 9/28 | 22.3<br>20.5        | 36.5<br>36.6       | 8.18<br>8.16 | 23<br>16                             |
| 34          | 202         | 50         | oc                 | n              | 10/ 9/28             | 25.0                | 36.5               | 8.21         | 3                                    |
| 35          | 207         | 50         | r                  | p              | 10/26/28             | 16.8                | 34.7               | 7.92         | 138                                  |
| 35a<br>5-36 | 208<br>209  | 0          | oc<br>oc           | n<br>n         | 10/30/28<br>10/26/28 | (26.5<br>(27.4      | 31.6<br>29.7       | 8.23<br>8.31 | 16)<br>15)                           |
| 5-36        | 212         | ő          | oc                 | n              | 10/20/28             | (26.9               | 35.6               | 8.27         | 15)                                  |
| 36          | 213         | 0          | r                  | n              | 10/30/28             | 26.5                | 31.6               | 8.23         | 16                                   |
| 36          | 215         | 100        | r                  | n              | 10/30/28             | 14.4                | 34.9               | 7.85         | 149                                  |
| 36<br>37    | 216<br>219  | 100        | oc<br>oc           | p<br>n         | 10/30/28<br>11/ 1/28 | 26.5<br>15.1        | 31.6<br>34.9       | 8.23<br>7.82 | 16<br>153                            |
| 40          | 229         | 0          | r                  | n              | 11/ 8/28             | 22.2                | 33.7               | 8.21         | 24                                   |
| 40          | 231         | 100        | r                  |                | 11/ 8/28             | 13.9                | 35.0               | 7.85         | 159                                  |
| 40<br>40    | 232<br>233  | 0<br>50    | r                  |                | 11/ 8/28<br>11/ 8/28 | 22.2<br>15.3        | 33.7<br>34.9       | 8.21<br>7.87 | 24<br>161                            |
| 40          | 234         | 100        | r                  | p              | 11/ 8/28             | 13.9                | 35.0               | 7.85         | 159                                  |
| 41          | 235         | 0          | r                  | n              | 11/10/28             | 20.4                | 34.2               | 8.11         | 32                                   |
| 41          | 237<br>238  | 100        | r                  |                | 11/10/28<br>11/10/28 | 14.5<br>20.4        | 35.0<br>34.2       | 7.91<br>8.11 | 152<br>32                            |
| 41          | 239         | 100        | r                  |                | 11/10/28             | 14.5                | 35.0               | 7.91         | 152                                  |
| 41a         | 240         | 0          | r                  | 'n             | 11/10/28             | (20.4               | 34.2               | 8.11         | 32)                                  |
| 42          | 241<br>247  | 0          | r                  |                | 11/13/28             | 18.7<br>19.6        | 34.7               | 8.06<br>8.09 | 45<br>52                             |
| 44          | 250         | 0          | r                  | p<br>n         | 11/15/28<br>11/17/28 | 20.7                | 34.8<br>34.9       | 8.03         | 38                                   |
| 45          | 257         | 50         | r                  | n              | 11/19/28             | 22.4                | 35.2               | 8.13         | 46                                   |
| 45          | 259         | 0          | oc                 |                | 11/19/28             | 22.4                | 35.3               | 8.12         | 38                                   |
| 46<br>46    | 261<br>262  | 0<br>50    | oc<br>r            |                | 11/21/28<br>11/21/28 | 23.3<br>23.2        | 35.3<br>35.3       | 8.16<br>8.16 | 36<br>40                             |
| 46          | 263         | 100        | r                  |                | 11/21/28             | 22.5                | 35.4               | 8.17         | 40                                   |
| 46          | 264         | 0          | r.                 | p              | 11/21/28             | 23.3                | 35.3               | 8.16         | 36                                   |
| 46          | 265         | 50         | r                  |                | 11/21/28             | 23.2                | 35.3<br>36.0       | 8.16<br>8.23 | 40<br>17                             |
| 47<br>47    | 266<br>267  | 0<br>50    | r                  |                | 11/23/28<br>11/23/28 | 23.9<br>23.8        | 36.0               | 8.23         | 20                                   |
| 47          | 268         | 100        | oc                 |                | 11/23/28             | 22.7                | 36.2               | 8.23         | 20                                   |
| T 4         |             |            |                    |                |                      | 23.9                | 36.0               | 8.23         | 17                                   |

Table 23. Distributional and environmental records for Ceratium tripos subsp. semipulchellum--Continued

|  |  | Ce   | ratium tripos                                      | subsp.         | semipuicne  | ellum Continue   | ed   |  |  |
|--|--|--|--|----------------|---|--|--|--|--|
| Station  | Sample   | Depth (m)  | Relative abundance                                 | Appa-<br>ratus | Date  | Temperature (°C)   | Salinity<br>(0/00)   | pН   | PO4<br>mg/m <sup>3</sup>   |
| 47<br>48<br>48<br>48<br>48<br>48<br>49<br>49<br>56<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57 | 269<br>270<br>271<br>272<br>273<br>274<br>277<br>281<br>333<br>334<br>335<br>333<br>334<br>335<br>336<br>337<br>338<br>340<br>344<br>350<br>351<br>361<br>369<br>370<br>373<br>374<br>376<br>377<br>378<br>378<br>389<br>387<br>389<br>391<br>401<br>402<br>403<br>404<br>405<br>407<br>408<br>407<br>408<br>407<br>408<br>407<br>408<br>407<br>408<br>407<br>408<br>407<br>408<br>407<br>408<br>409<br>411<br>412<br>413<br>414<br>415<br>416<br>417<br>417<br>418<br>418<br>418<br>418<br>418<br>419<br>419<br>411<br>411<br>412<br>413<br>414<br>415<br>416<br>417<br>417<br>418<br>418<br>418<br>418<br>418<br>418<br>418<br>418<br>418<br>418 | (m)  0 50 100 0 50 100 0 50 100 0 0 50 100 0 100 0 100 0 50 100 0 50 0 0 0 | abundance  r r oc oc oc r r r r oc oc oc r r r r r |                | 11/23/28 11/25/28 11/25/28 11/25/28 11/25/28 11/25/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/27/28 11/20/28 11/20/28 11/20/28 11/224/28 11/24/28 11/24/28 11/24/28 11/24/28 11/24/28 11/24/28 11/24/28 11/24/28 11/24/28 11/29 11/1/29 | (°C)  23.9 23.6 23.6 23.6 22.7 23.6 23.4 22.6 16.6 16.6 16.9 19.0 15.6 114.3 17.0 16.3 11.4 16.3 (16.9 (16.9 16.2 13.1 19.2 13.1 (20.5 20.5 (20.5 (20.5 (20.5 (20.5 (20.5 (20.5 (20.5 (20.5 (20.6 (20. | (0/00)  36.00  36.14  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.34  36.66  3 | 8.23<br>8.23<br>8.24<br>8.26<br>8.11<br>8.11<br>8.14<br>8.14<br>8.14<br>8.14<br>8.10<br>8.10<br>8.10<br>8.05<br>8.10<br>8.05<br>8.10<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.12<br>8.13<br>8.10<br>8.10<br>8.10<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.07<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10 | mg/m3  17 113 16 16 13 13 12 12 20 20 21 40 20 20 40 20 40 20 40 20 40 20 40 20 21 21 21 21 21 21 21 21 21 21 21 21 21 |

Table 23. Distributional and environmental records for Ceratium tripos subsp. semipulchellum--Continued

| Station  | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature (°C) | Salinity<br>(0/00) | pН           | PO4<br>mg/m <sup>3</sup> |
|----------|------------|-----------|--------------------|----------------|--------------------|------------------|--------------------|--------------|--------------------------|
| 75       | 464        | 100       | r                  | n              | 2/14/29            | 17.8             | 35.4               | 8.00         | 75                       |
| 75       | 466        | 50        | r                  | p              | 2/14/29            | 20.0             | 35.5               | 8.14         | 46                       |
| 77       | 472        | 0         | С                  | n              | 2/18/29            | 23.7             | 36.0<br>36.0       | 8.19<br>8.19 | 16<br>16                 |
| 77<br>77 | 473<br>474 | 0<br>50   | 00                 | p              | 2/18/29<br>2/18/29 | 23.7<br>23.5     | 36.0               | 8.19         | 16                       |
| 78       | 475        | 0         | 0C<br>0C           | p<br>n         | 2/20/29            | 24.6             | 36.0               | 8.17         | 32                       |
| 78       | 476        | 50        | r                  | n              | 2/20/29            | 23.8             | 36.1               | 8.14         | 32                       |
| 78       | 477        | 100       | oc                 | n              | 2/20/29            | 21.9             | 36.2               | 8.14         | 34                       |
| 78       | 478        | 0         | oc                 | p              | 2/20/29            | 24.6             | 36.0               | 8.17         | 32<br>32                 |
| 78       | 479        | 50<br>100 | r                  | p              | 2/20/29<br>2/20/29 | 23.8<br>21.9     | 36.1<br>36.2       | 8.14<br>8.14 | 34                       |
| 78<br>79 | 480<br>481 | 0         | oc                 | p<br>n         | 2/22/29            | 25.2             | 36.0               | 8.17         | 34                       |
| 79       | 482        | 50        | oc                 | n              | 2/22/29            | 24.5             | 36.1               | 8.17         | 34                       |
| 79       | 483        | 100       | oc                 | n              | 2/22/29            | 21.8             | 36.2               | 8.13         | 45                       |
| 79       | 484        | 0         | oc                 | p              | 2/22/29            | 25.2             | 36.0               | 8.17<br>8.17 | 34                       |
| 79       | 485        | 50<br>0   | oc                 | p<br>n         | 2/22/29<br>2/24/29 | 24.5<br>26.0     | 36.1<br>35.9       | 8.20         | 34<br>36                 |
| 80<br>80 | 486<br>487 | 50        | oc<br>oc           | n              | 2/24/29            | 25.9             | 36.0               | 8.19         | 29                       |
| 80       | 488        | 0         | oc                 | p              | 2/24/29            | 26.0             | 25.9               | 8.20         | 36                       |
| 80       | 489        | 50        | oc                 | p              | 2/24/29            | 25.9             | 36.0               | 8.19         | 29                       |
| 80       | 490        | 100       | oc                 | p              | 2/24/29            | 23.4             | 36.2               | 8.16         | 32                       |
| 81       | 491        | 0         | С                  | n              | 2/26/29            | 26.5             | 35.8<br>35.9       | 8.19<br>8.19 | 38<br>38                 |
| 81<br>81 | 492<br>493 | 50<br>0   | oc<br>oc           | n<br>n         | 2/26/29<br>2/26/29 | 26.4<br>26.5     | 35.8               | 8.19         | 38                       |
| 81       | 493        | 50        | 00                 | p<br>p         | 2/26/29            | 26.4             | 35.9               | 8.19         | 38                       |
| 81       | 495        | 100       | r                  | p              | 2/26/29            | 23.6             | 36.2               | 8.18         | 36                       |
| 82       | 497        | 50        | oc                 | n              | 2/28/29            | 27.2             | 36.3               | 8.21         | 34                       |
| 82       | 500        | 100       | r                  | p              | 2/28/29            | 24.4             | 36.5               | 8.19         | 34                       |
| 83       | 501        | . 0       | oc                 | n              | 3/ 2/29<br>3/ 2/29 | 27.5<br>27.4     | 36.3<br>36.5       | 8.24<br>8.24 | 29<br>25                 |
| 83<br>83 | 502<br>503 | 50<br>0   | c                  | n<br>p         | 3/ 2/29            | 27.5             | 36.3               | 8.24         | 29                       |
| 84       | 505        | ŏ         | r                  | n              | 3/ 4/29            | 27.8             | 36.2               | 8.23         | 24                       |
| 84       | 506        | 50        | oc                 | n              | 3/4/29             | 27.5             | 36.4               | 8.21         | 24                       |
| 85       | 510        | 0         | oc                 | n              | 3/ 6/29            | 27.9             | 36.2               | 8.22         | 40                       |
| 85       | 511        | 50        | oc                 | n              | 3/ 6/29            | 27.8             | 36.2<br>36.2       | 8.22<br>8.22 | 40<br>17                 |
| 86<br>88 | 517<br>526 | 50<br>0   | oc<br>oc           | n<br>n         | 3/9/29<br>3/21/29  | 27.4<br>28.5     | 35.9               | 8.23         | 16                       |
| 88       | 527        | 50        | oc                 | n              | 3/21/29            | 28.4             | 35.9               | 8.25         | 13                       |
| 89       | 528        | 0         | oc                 | n              | 3/23/29            | 28.4             | 35.6               | 8.25         | 21                       |
| 89       | 529        | 50        | С                  | n              | 3/23/29            | 28.6             | 35.8               | 8.27         | 12                       |
| 89       | 531        | 100       | r                  | p              | 3/23/29            | 26.4             | 36.0<br>35.5       | 8.24<br>8.27 | 12<br>21                 |
| 90       | 533        | 0         | r                  | n              | 3/25/29<br>3/25/29 | 28.5<br>28.5     | 35.5               | 8.27         | 21                       |
| 90<br>91 | 535<br>540 | 0         | oc<br>r            | p<br>n         | 3/27/29            | 28.7             | 35.1               | 8.30         | 21                       |
| 91       | 541        | 50        | c                  | n              | 3/27/29            | 28.5             | 35.2               | 8.30         | 24                       |
| 92       | 546        | 50        | c                  | n              | 3/29/29            | 28.4             | 35.4               | 8.29         | 28                       |
| 92       | 548        | 50        | r                  | p              | 3/29/29            | 28.4<br>28.7     | 35.4<br>34.7       | 8.29<br>8.30 | 28<br>28                 |
| 93<br>93 | 550<br>551 | 0<br>50   | c                  | n<br>n         | 3/31/29<br>3/31/29 | 28.5             | 34.8               | 8.30         | 28                       |
| 93       | 552        | 0         | c<br>oc            | p              | 3/31/29            | 28.7             | 34.7               | 8.30         | 28                       |
| 93       | 553        | 100       | r                  | p              | 3/31/29            | 27.6             | 35.8               | 8.27         | 29                       |
| 94       | 558        | 50        | oc                 | n              | 4/22/29            | 29.3             | 34.7               | 8.25         | 14<br>25                 |
| 94       | 559        | 100       | oc                 | n              | 4/22/29            | 28.5<br>29.3     | 35.6<br>34.9       | 8.21<br>8.24 | 25<br>16                 |
| 95<br>95 | 563<br>564 | 50<br>100 | c<br>c             | n<br>n         | 4/24/29 4/24/29    | 28.5             | 35.4               | 8.22         | 21                       |
| 95       | 566        | 50        | r                  | p              | 4/24/29            | 29.3             | 34.9               | 8.24         | 16                       |
| 95       | 567        | 100       | r                  | p              | 4/24/29            | 28.5             | 35.4               | 8.22         | 21                       |
| 96       | 568        | 0         | c                  | n              | 4/26/29            | 29.3             | 35.3               | 8.23         | 12                       |
| 95       | 568A       | 0         | oc                 | n              | 4/24/29            | (29.4<br>29.2    | 34.7               | 8.26<br>8.23 | 14)                      |
| 96       | 569        | 50        | oc                 | n<br>n         | 4/26/29<br>4/26/29 | 29.2<br>28.2     | 35.3<br>35.7       | 8.19         | 12<br>25                 |
| 96<br>96 | 570<br>571 | 100       | oc                 | n<br>p         | 4/26/29            | 29.3             | 35.3               | 8.23         | 12                       |
| 96       | 573        | 100       | r                  | p              | 4/26/29            | 28.2             | 35.7               | 8.19         | 12<br>25                 |
| 97       | 575        | 50        | c                  | n              | 4/28/29            | 28.0             | 35.4               | 8.16         | 21                       |
| 97       | 576        | 100       | oc                 | n              | 4/28/29            | 27.6             | 35.6               | 8.15<br>8.16 | 25                       |
| 97       | 578        | 50        | r                  | p              | 4/28/29            | 28.0<br>27.6     | 35.4<br>35.6       | 8.15         | 21<br>25                 |
| 97       | 579        | 100       | r                  | p<br>n         | 4/28/29<br>4/30/29 | 27.0             | 35.3               | 8.16         | 24                       |
| 98<br>98 | 581<br>582 | 50        | oc<br>oc           | n              | 4/30/29            | 26.9             | 35.3               | 8.16         | 28                       |
| 98       | 584        | 0         | oc                 | p              | 4/30/29            | 27.0             | 35.3               | 8.16         | 24                       |
| 98       | 585        | 50        | r                  | p              | 4/30/29            | 26.9             | 35.3               | 8.16         | 28                       |
| 98       | 588        | 100       | r                  | p              | 4/30/29            | 26.7             | 35.4               | 8.14         | 32                       |
| 88       | 589        | 0         | С                  | n              | 5/ 2/29            | 27.9             | 34.9<br>34.9       | 8.21<br>8.22 | 12<br>12                 |
| 99       | 590        | 50        | С                  | n              | 5/ 2/29<br>5/ 2/29 | 27.8<br>27.8     | 35.0               | 8.22         | 17                       |
| 99       | 591        | 100       | С                  | n              | 3/ 2/29            | 41.0             | 00.0               | 0.22         | - 1                      |

Table 23. Distributional and environmental records for Ceratium tripos subsp. semipulchellum--Continued

|            |            |            | eratium tripos     | s subsp.       | semipuich          | ellumContinu        | ea                 |              |                                      |
|------------|------------|------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------------------------|
| Station    | Sample     | Depth (m)  | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 99         | 592        | 0          | oc                 | р              | 5/ 2/29            | 27.9                | 34.9               | 8.21         | 12                                   |
| 99         | 592        | ŏ          | r                  | p              | 5/ 2/29            | 27.9                | 34.9               | 8.21         | 12                                   |
| 99         | 593        | 50         | r                  | p              | 5/ 2/29            | 27.8                | 34.9               | 8.22         | 12                                   |
| -99        | 594        | 100        | r                  | p              | 5/ 2/29            | 27.8                | 35.0               | 8.22         | 17                                   |
| 99         | 595        | 0          | c ·                | 'n             | 5/ 2/29            | 27.9                | 34.9               | 8.21         | 12                                   |
| 100        | 596        | 50         | С                  | n              | 5/ 4/29            | 27.6                | 34.7               | 8.21         | 10                                   |
| 100        | 597        | 100        | С                  | n              | 5/ 4/29            | 27.6                | 34.7               | 8.22         | 12                                   |
| 100        | 598        | _0         | oc                 | p              | 5/ 4/29            | 27.7                | 34.7               | 8.21         | 10                                   |
| 100        | 599        | 50         | oc                 | p              | 5/ 4/29            | 27.6                | 34.7               | 8.21         | 10                                   |
| 100        | 602        | 100        | oc                 | p              | 5/ 4/29            | 27.6                | 34.7               | 8.22         | 12                                   |
| 101        | 603        | 0          | С                  | n              | 5/ 7/29            | 26.3                | 34.7               | 8.24         | 8                                    |
| 101        | 606        | 0          | r                  | p              | 5/ 7/29            | 26.3                | 34.7               | 8.24         | 8                                    |
| 101        | 607        | 50         | r                  | p              | 5/ 7/29            | 26.2                | 34.7               | 8.24         | 8                                    |
| 102<br>102 | 609<br>610 | 0<br>50    | c                  | n              | 5/ 9/29            | 25.8                | 35.0               | 8.24         | 8                                    |
| 102        | 611        | 100        | c<br>c             | n              | 5/ 9/29<br>5/ 9/29 | 25.8                | 35.0               | 8.24<br>8.23 | 8                                    |
| 102        | 612        | 0          | r                  | n              | 5/ 9/29            | 25.6<br>25.8        | 35.0<br>35.0       | 8.24         | 8                                    |
| 102        | 613        | 50         | oc                 | p              | 5/ 9/29            | 25.8                | 35.0               | 8.24         | 8                                    |
| 103        | 615        | 0          | c                  | p<br>n         | 5/11/29            | 26.0                | 35.0               | 8.25         | 5                                    |
| 103        | 616        | 50         | c                  | n              | 5/11/29            | 25.8                | 35.2               | 8.25         | 5                                    |
| 103        | 617        | 100        | c                  | n              | 5/11/29            | 24.8                | 35.2               | 8.25         | 5                                    |
| 103        | 618        | 0          | r                  | p              | 5/11/29            | 26.0                | 35.0               | 8.25         | 5                                    |
| 103        | 620        | 100        | r                  | p              | 5/11/29            | 24.8                | 35.2               | 8.25         | 8<br>5<br>5<br>5<br>5<br>7<br>7      |
| 104        | 621        | 0          | c                  | 'n             | 5/13/29            | 26.1                | 35.2               | 8.24         | 7                                    |
| 104        | 622        | 50         | c                  | n              | 5/13/29            | 25.8                | 35.2               | 8.24         | 7                                    |
| 104        | 623        | 100        | С                  | n              | 5/13/29            | 25.3                | 35.3               | 8.21         | 7                                    |
| 104        | 625        | 50         | r                  | p              | 5/13/29            | 25.8                | 35.2               | 8.24         | 775555555544                         |
| 104        | 626        | 100        | r                  | p              | 5/13/29            | 25.3                | 35.3               | 8.21         | 7                                    |
| 105        | 628        | 50         | С                  | n              | 5/15/29            | 26.8                | 34.9               | 8.23         | 5                                    |
| 105        | 629        | 100        | oc                 | n              | 5/15/29            | 25.2                | 35.1               | 8.23         | 5                                    |
| 105        | 630        | 0          | r                  | p              | 5/15/29            | 26.9                | 34.9               | 8.23         | 5                                    |
| 106        | 633        | 0          | oc                 | n              | 5/17/29            | 27.2                | 35.0               | 8.23         | 5                                    |
| 106        | 634        | 50         | С                  | n              | 5/17/29            | 27.0                | 35.0               | 8.23         | 5                                    |
| 106        | 635        | 100        | С                  | n              | 5/17/29            | 25.6                | 35.1               | 8.23         | 5                                    |
| 107<br>107 | 639<br>640 | 0<br>50    | С                  | n              | 5/19/29<br>5/19/29 | 28.0<br>27.9        | 34.4               | 8.23         | 5                                    |
| 107        | 641        | 100        | C                  | n              | 5/10/29            | 26.8                | 34.4<br>34.9       | 8.23         | 4                                    |
| 108        | 646        | 0          | c<br>oc            | n              | 5/19/29<br>5/27/29 | 28.4                | 35.0               | 8.23<br>8.25 | 4                                    |
| 108        | 647        | 50         | c                  | n<br>n         | 5/27/29            | 26.8                | 35.0               | 8.24         | 72                                   |
| 108        | 648        | 100        | c                  | n              | 5/27/29            | 25.2                | 35.0               | 8.23         | Ā                                    |
| 109        | 656        | 100        | oc                 | n              | 5/29/29            | 19.4                | 34.8               | 8.18         | 5                                    |
| 109        | 658        | 50         | r                  | p              | 5/29/29            | 23.1                | 35.0               | 8.22         | 3                                    |
| 109        | 659        | 100        | r                  | p              | 5/29/29            | 19.4                | 34.8               | 8.18         | 4 4 4 5 3 5 5 5 5 5 5                |
| 110        | 661        | 0          | r                  | 'n             | 5/31/29            | 23.9                | 34.7               | 8.18         | 5                                    |
| 110        | 661        | 0          | ос                 | p              | 5/31/29            | 23.9                | 34.7               | 8.18         | 5                                    |
| 111        | 664        | 0          | a                  | n              | 6/ 3/29            | 20.1                | 34.5               | 8.18         | 5                                    |
| 111        | 669        | 50         | oc                 | n              | 6/ 3/29            | 19.4                | 34.6               | 8.17         | 5                                    |
| 111        | 670        | 100        | r                  | n              | 6/ 3/29            | 18.2                | 34.7               | 8.13         | 13                                   |
| 111        | 671        | 0          | oc                 | p              | 6/ 3/29            | 20.1                | 34.5               | 8.18         | 5                                    |
| 111        | 672        | 50         | oc                 | p              | 6/ 3/29            | 19.4                | 34.6               | 8.17         | 5<br>5<br>5                          |
| 111        | 674        | 0          | С                  | n              | 6/ 3/29            | 20.1                | 34.5               | 8.18         | 5                                    |
| 112        | 675        | 50         | С                  | n              | 6/ 5/29            | 21.7                | 34.6               | 8.23         | 7                                    |
| 112        | 676        | 100        | oc                 | n              | 6/ 5/29            | 19.8                | 34.7               | 8.20         | 8                                    |
| 112        | 677        | 0          | oc                 | p              | 6/ 5/29            | 23.2<br>24.2        | 34.6               | 8.22<br>8.25 | 7<br>5<br>5                          |
| 113<br>113 | 680<br>681 | 50         | c                  | n              | 6/25/29<br>6/25/29 | 23.8                | 34.5<br>34.6       | 8.25         | 5                                    |
| 113        | 682        | 100        | c                  | n              | 6/25/29            | 21.5                | 34.7               | 8.23         | 8                                    |
| 113        | 683        | 0          | oc                 | n              | 6/25/29            | 24.2                | 34.5               | 8.25         | 5                                    |
| 114        | 690        | 50         | oc                 | p<br>p         | 6/27/29            | 16.2                | 34.6               | 8.04         | 63                                   |
| 115        | 692        | 0          | oc                 | n              | 6/29/29            | 20.6                | 34.6               | 8.19         | 4                                    |
| 115        | 693        | 50         | r                  | n              | 6/29/29            | 17.5                | 34.6               | 8.12         | 17                                   |
| 115        | 694        | 100        | r                  | n              | 6/29/29            | 15.6                | 34.6               | 8.08         | 27                                   |
| 115        | 695-6      | 0          | oc                 | p              | 6/29/29            | 20.6                | 34.6               | 8.19         | 4                                    |
| 117        | 709        | 50         | oc                 | n              | 7/ 3/29            | 12.5                | 34.2               | 8.06         | 51                                   |
| 133        | 804        | 0          | ос                 | n              | 9/10/29            | 22.7                | 34.7               | 8.47         | 7                                    |
| 133        | 805        | 50         | ос                 | n              | 9/10/29            | 20.8                | 34.7               | 8.37         | 7                                    |
| 133        | 806        | 100        | r                  | n              | 9/10/29            | 18.4                | 34.8               | 8.31         | 7                                    |
| 134        | 808        | 0          | С                  | n              | 9/12/29            | 22.9                | 34.7               | 8.34         | 6                                    |
| 134        | 809        | 50         | oc                 | n              | 9/12/29            | 19.8                | 34.6               | 8.34         | 6                                    |
| 134        | 810        | 100        | oc                 | n              | 9/12/29            | 18.1                | 34.6               | 8.34         | 6                                    |
| 133        | 812        | 0          | oc                 | p              | 9/10/29            | 22.7                | 34.7               | 8.47         | 7                                    |
| 133        | 814        | 100        | ос                 | p              | 9/10/29            | 18.4                | 34.8               | 8.31         | 6<br>7<br>7<br>6<br>6                |
| 134        | 815        | 0          | ос                 | p              | 9/12/29            | 22.9                | 34.7               | 8.34         | 6                                    |
|            |            | 100        | 0.0                | 92             | 9/12/29            | 18.1                | 34.6               | 8.34         | 6                                    |
| 134<br>135 | 817<br>822 | 100<br>100 | oc<br>oc           | p<br>n         | 9/14/29            | 18.7                | 34.8               | 8.34         | 5                                    |

Table 23. Distributional and environmental records for Ceratium tripos subsp. semipulchellum--Continued

|            |                    | Ce        | ratium tripos      | subsp. s       | semipuicne           | llum Continue       | α                  |              |                                 |
|------------|--------------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|---------------------------------|
| Station    | Sample             | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO4<br>mg/m <sup>3</sup>        |
| 195        | 824                | 0         | _                  | _              | 0 /1 4 /90           | 99.0                | 9E 1               | 0 97         | 17                              |
| 135        | 826                | 100       | r                  | p              | 9/14/29              | 23.8                | 35.1               | 8.37         | 7                               |
| 135<br>136 | 827                | 0         | r                  | p              | 9/14/29<br>9/16/29   | 18.7<br>24.6        | 34.8<br>35.4       | 8.34<br>8.37 | ວ                               |
| 136        | 828                | 50        | oc                 | n              | 9/16/29              | 21.4                | 35.4               | 8.39         | 3                               |
| 136        | 832                | 0         | oc<br>r            | n              | 9/16/29              | 24.6                | 35.4               | 8.37         | 3                               |
| 136        | 829                | 100       | oc                 | p<br>n         | 9/16/29              | 18.6                | 35.0               | 8.39         | 3                               |
| 136        | 833                | 50        | r                  | p              | 9/16/29              | 21.4                | 35.1               | 8.39         | 3                               |
| 136        | 834                | 100       | r                  | p              | 9/16/29              | 18.6                | 35.0               | 8.39         | 3                               |
| 137        | 836                | 0         | c                  | n              | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                               |
| 137        | 837                | Ō         | c                  | n              | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                               |
| 137        | 840                | Ō         | r                  | p              | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                               |
| 137        | 841                | Ö         | oc                 | p              | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                               |
| 138        | 843                | 0         | oc                 | 'n             | 9/20/29              | 26.1                | 34.8               | 8.35         | 5                               |
| 138        | 845                | 100       | С                  | n              | 9/20/29              | 22.2                | 34.8               | 8.31         | 3                               |
| 138        | 848                | 50        | r                  | p              | 9/20/29              | 26.1                | . 34.8             | 8.35         | 5                               |
| 139        | 849                | 0         | r                  | n              | 9/22/29              | 26.7                | 34.8               | 8.34         | 6                               |
| 139        | 850                | 50        | С                  | n              | 9/22/29              | <b>25</b> .8        | 34.9               | 8.31         | 6                               |
| 139        | 851                | 100       | oc                 | n              | 9/22/29              | 22.4                | 35.2               | 8.28         | 6                               |
| 139        | 854                | 50        | r                  | p              | 9/22/29              | 25.8                | 34.9               | 8.31         | 6                               |
| 139        | 855                | 100       | $\mathbf{r}$       | p              | 9/22/29              | 22.4                | 35.2               | 8.28         | 6                               |
| 140        | 856                | 0         | c                  | n              | 10/ 3/29             | 26.9                | 35.0               | 8.42         | 7533333344445356666677          |
| 140        | 857                | 50        | oc                 | n              | 10/ 3/29             | 26.9                | 35.0               | 8.39         | 7                               |
| 140        | 858                | 100       | oc                 | n              | 10/ 3/29             | 25.5                | 35.0               | 8.34         | 7                               |
| 140        | 860                | 0         | r                  | p              | 10/ 3/29             | 26.9                | 35.0               | 8.42         | 7                               |
| 140        | 861                | 50        | r                  | p              | 10/ 3/29             | 26.9                | 35.0               | 8.39         | 7                               |
| 140        | 863                | 100       | r                  | p              | 10/ 3/29             | 25.5                | 35.0               | 8.34         | 7                               |
| 141        | 864                | 0         | C                  | n              | 10/ 5/29             | 25.9                | 35.2               | 8.34         | 5<br>5<br>5<br>5<br>7<br>5<br>7 |
| 141        | 865                | 50        | С                  | n              | 10/ 5/29             | 24.8                | 35.3               | 8.34         | 5                               |
| 141        | 871                | 100       | · · · r            | p              | 10/ 5/29             | 20.0                | 35.0               | 8.33         | ā                               |
| 142        | 873                | 50        | oc                 | n              | 10/ 5/29             | 20.0                | 35.0               | 8.33         | 5                               |
| 142        | 874                | 100       | С                  | n              | 10/ 5/29             | 16.6                | 34.4               | 8.27         | 7                               |
| 142<br>142 | 876<br>878         | 0<br>100  | oc                 | p              | 10/ 5/29             | 24.1                | 34.8<br>34.4       | 8.33<br>8.27 | 5                               |
| 142        | 879                | 100       | r                  | p              | 10/ 5/29<br>10/ 5/29 | 16.6                |                    | 8.27         | 7                               |
| 143        | 881                | 0         | r                  | p              | 10/ 9/29             | 16.6<br>22.4        | 34.4<br>34.4       | 8.30         | 6                               |
| 143        | 882                | 50        | c                  | n<br>n         | 10/ 9/29             | 19.0                | 34.2               | 8.34         | 6                               |
| 143        | 883                | 100       | oc<br>oc           | n              | 10/ 9/29             | 13.8                | 34.1               | 8.30         | 10                              |
| 143        | 884                | 0         | oc                 |                | 10/ 9/29             | 22.4                | 34.4               | 8.30         | 6                               |
| 144        | 886                | ő         | C                  | p<br>n         | 10/11/29             | 23.3                | 35.0               | 8.37         | 6                               |
| 144        | 887                | ŏ         | oc                 | p              | 10/11/29             | 23.3                | 35.0               | 8.37         | 6                               |
| 144        | 889                | 100       | r                  | p              | 10/11/29             | 16.6                | 34.5               | 8.37         | 6                               |
| 145        | 891                | 50        | c                  | n              | 10/11/29             | 18.7                | 34.3               | 8.34         | 6                               |
| 145        | 894                | 50        | r                  | p              | 10/11/29             | 18.7                | 34.3               | 8.34         | 6                               |
| 146        | 896                | 0         | oc                 | n              | 10/15/29             | 22.4                | 34.9               | 8.37         | 6                               |
| 146        | 897                | 50        | oc                 | n              | 10/15/29             | 22.4                | 34.9               | 8.30         | 6<br>6                          |
| 146        | 898                | 100       | oc                 | n              | 10/15/29             | 19.7                | 34.3               | 8.26         | 7                               |
| 146        | 901                | 50        | r                  | р              | 10/15/29             | 22.4                | 34.9               | 8.30         | 6                               |
| 147        | 903                | 0         | ос                 | 'n             | 10/17/29             | 23.3                | 35.3               | 8.26         | 8                               |
| 147        | 904                | 50        | r                  | n              | 10/17/29             | 23.1                | 35.3               | 8.29         | 5                               |
| 147        | 907                | 0         | oc                 | p              | 10/17/29             | 23.3                | 35.3               | 8.26         | 8                               |
| 149        | 920                | 0         | ос                 | n              | 10/21/29             | 23.5                | 35.0               | 8.34         | 6                               |
| 149        | 921                | 50        | oc                 | n              | 10/21/29             | 23.3                | 35.0               | 8,37         | 6                               |
| 149        | 922                | 100       | oc                 | n              | 10/21/29             | 20.3                | 34.9               | 8.38         | 6                               |
| 149        | 928                | 50        | r                  | p              | 10/21/29             | 23.3                | 35.0               | 8.37<br>8.39 | 6                               |
| 150        | 929<br>930         | 0<br>50   | oc                 | n              | 10/23/29 10/23/29    | 25.6                | 34.7<br>34.8       | 8.35         | 10                              |
| 150        |                    |           | r                  | n              |                      | 27.8<br>19.6        | 34.6               | 8.32         | 11                              |
| 150        | 931                | 100       | r                  | n              | 10/23/29             |                     | 34.4               |              |                                 |
| 151<br>151 | 938<br>9 <b>39</b> | 50<br>100 | c                  | n              | 10/26/29             | 18.3<br>12.5        | 34.4               | *****        | ***                             |
| 151        | 942                | 50        | 00                 | n              | 10/26/29             | 18.3                | 34.4               | • • • • •    |                                 |
| 152        | 942                | 50        | oc<br>oc           | p<br>n         | 10/26/29<br>10/27/29 | 14.2                | 34.5               | 7.87         | 53                              |
| 152        | 949                | 50        | r                  |                | 10/27/29             | 14.2                | 34.5               | 7.87         | 53                              |
| 152        | 950                | 100       | r                  | p              | 10/27/29             | 11.4                | 34.7               | 7.76         | 75                              |
| 153        | 951                | 0         | oc                 | p<br>n         | 10/27/29             | 28.1                | 34.2               | 8.47         | 75<br>7                         |
| 153        | 952                | 50        | c                  | n              | 10/29/29             | 28.1                | 34.4               | 8.39         | 7                               |
| 153        | 953                | 100       | oc                 | n              | 10/29/29             | 20.5                | 34.7               | 8.28         | 31                              |
| 153        | 955                | 0         | r                  | p              | 10/29/29             | 28.1                | 34.2               | 8.47         | 31<br>7                         |
| 153        | 956                | 50        | oc                 | p              | 10/29/29             | 28.1                | 34.4               | 8.39         | 7                               |
| 153        | 957                | 100       | oc                 |                | 10/29/29             | 20.5                | 34.7               | 8.28         | 31                              |
| 164        | 958                | 0         | DC                 |                | 10/31/29             | 28.3                | 34.2               | 8.39         | 31<br>7                         |
| 154        | 959                | 50        | oc                 | n              | 10/31/29             | 28.2                | 34.2               | 8.40         | 7                               |
| 154        | 960                | 100       | oc                 | n              | 10/31/29             | 25.3                | 34.8               | 7.93         | 21                              |
| 155        | 965                | 0         | c                  | n              | 11/ 2/29             | 27.8                | 34.9               | 8.29         | 29                              |
| 155        | 966                | 50        | c                  | n              | 11/ 2/29             | 27.7                | 34.9               | 8.30         | 30                              |
| 155        | 967                | 100       | oc                 |                | 11/ 2/29             | 27.2                | 35.0               | 8.30         | 35                              |
| 700        | 201                | 200       |                    |                | / ~/ 60              | -110                |                    |              |                                 |

Table 23. Distributional and environmental records for Ceratium tripos subsp. semipulchellum--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature (°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m |
|---------|--------|-----------|--------------------|----------------|----------|------------------|--------------------|------|-------------|
| 155     | 973    | 50        | r                  | ~              | 11/ 2/29 | 27.7             | 34.9               | 8.30 | 30          |
| 156     | 972    | 0         | oc                 | p<br>n         | 11/ 4/29 | 27.6             | 35.0               | 8.34 | 28          |
| 156     | 972    | ŏ         | r                  | n              | 11/ 4/29 | 27.6             | 35.0               | 8.34 | 28          |
| 156     | 974    | 100       | oc                 | n              | 11/ 4/29 | 26.4             | 35.1               | 8.30 | 48          |
| 157     | 978    | 0         | oc                 | n              | 11/ 6/29 | 27.1             | 35.3               | 8.27 | 47          |
| 157     | 979    | 50        | c                  | n              | 11/ 6/29 | 27.1             | 35.2               | 8.32 | 60          |
| 157     | 980    | 100       | r                  | n              | 11/ 6/29 | 26.8             | 35.5               | 8.30 | 64          |
| 158     | 983    | 0         | c                  | n              | 11/ 8/29 | 28.2             | 35.6               | 8.34 | 36          |
| 158     | 984    | 50        | C.                 | n              | 11/ 8/29 | 28.2             | 35.6               | 8.39 | 50          |
| 158     | 985    | 100       | c                  | n              | 11/ 8/29 | 27.6             | 35.9               | 8.39 | 48          |
| 159     | 990    | 0         | c                  | n              | 11/11/29 | 28.6             | 35.7               | 8.37 | 15          |
| 159     | 991    | 50        | c                  | n              | 11/11/29 | 28.5             | 35.7               | 8.39 | 15          |
| 159     | 992    | 100       | r                  | n              | 11/11/29 | 28.0             | 35.7               | 8.37 | 23          |
| 160     | 1000   | 0         | r                  | n              | 11/13/29 | 28.6             | 35.6               | 8.37 | 12          |
| 160     | 1002   | 50        | oc                 | n              | 11/13/29 | 28.6             | 35.6               | 8.39 | 15          |
| 160     | 1003   | 100       | r                  | n              | 11/13/29 | 28.5             | 35.7               | 8.44 | 16          |

Table 24. Distributional and environmental records for Ceratium pulchellum

| Station     | Sample      | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity     | pН           | PO <sub>4</sub> |
|-------------|-------------|--------------|--------------------|----------------|----------------------|---------------------|--------------|--------------|-----------------|
|             | L           | (m)          | abundance          | ratus          |                      | ( )                 | (0/00)       |              | mg/m3           |
| 14          | 93          | 0            | oc                 | n              | 8/ 9/28              | 21.2                | 35.2         | 8.18         | 11              |
| 15          | 101         | 50           | r                  | p<br>n         | 8/11/28              | 19.8                | 36.5         | 8.21         | 8               |
| 15          | 102         | 100          | r                  | n              | 8/11/28              | 18.4                | 36.4         | 8.20         | 19              |
| 16          | 103         | 0            | r                  | p              | 8/13/28              | 25.9                | 36.2         | 8.24         | 8               |
| 17          | 109         | ŏ            | r                  | p              | 8/15/28              | 26.2                | 36.6         | 8.29         | 9               |
| 18          | 114         | Ŏ            | oc                 | p              | 8/17/28              | 27.0                | 37.0         | 8.23         | 5               |
| 19          | 123         | 50           | r                  | n              | 8/20/28              | 25.2                | 37.1         | 8.27         | 5<br>5<br>5     |
| 20          | 125         | 0            | r                  | p              | 8/22/28              | 26.0                | 36.6         | 8.37         | 5               |
| 20          | 126         | 50           | r                  | p              | 8/22/28              | 25.8                | 36.6         | 8.26         | 3<br>5          |
| 20          | 127         | 100          | r                  | p              | 8/22/28              | 22.6                | 36.7         | 8.19         | 5               |
| 20-21       | 131         | 0            | r                  | n              | 8/24/28              | (26.6               | 36.3         | 8.32         | 4)              |
| 21          | 134         | 100          | r                  | p              | 8/24/28              | 21.0                | 36.8         | 8.20         | 7               |
| 21          | 136         | 50           | r                  | n              | 8/24/28              | 24.4                | 36.2         | 8.26         | 4               |
| 21          | 137         | 100          | r                  | n              | 8/24/28              | 21.0                | 36.8         | 8.20         | 7               |
| 22          | 144         | 100          | r                  | n              | 8/27/28              | 17.5                | 36.1         | 7.99         | 123             |
| 23          | 145         | 0            | r                  | p              | 8/29/28              | 27.2                | 35.9         | 8.25         | 4               |
| 48          | 272         | 50           | r                  | n              | 11/25/28             | 23.6                | 36.4         | 8.24         | 16              |
| 48          | 274         | 0            | oc                 | p              | 11/25/28             | 23.6                | 36.4         | 8.24         | 16<br>16        |
| 48<br>49    | 275<br>280  | 50<br>0      | oc                 | p              | 11/25/28<br>11/27/28 | 23.6<br>23.4        | 36.4<br>36.2 | 8.24<br>8.27 | 13              |
| 49a         | 283         | 0            | r                  | p              | 11/29/28             | (23.2               | 36.0         | 8.23         | 13)             |
| 50          | 285         | 50           | r                  | n<br>n         | 11/29/28             | 22.0                | 35.9         | 8.23         | 13)             |
| 50          | 287         | 0            | oc                 | p              | 11/29/28             | 23.2                | 36.0         | 8.23         | 13              |
| 50-51       | 290         | ő            | oc                 | n              | 12/ 1/28             | (22.8               | 35.6         | 8.22         | 16)             |
| 50-51       | 291         | ŏ            | oc                 | n              | 12/ 1/28             | 22.8                | 35.6         | 8.22         | 16)             |
| 50-51       | 292         | ŏ            | oc                 | n              | 12/ 1/28             | (22.8               | 35.6         | 8.22         | 16)             |
| 51          | 294         | 50           | oc                 | n              | 12/ 1/28             | 20.5                | 35.6         | 8.22         | 17              |
| 51          | 296         | 0            | r                  | р              | 12/ 1/28             | 22.8                | 35.6         | 8.22         | 16              |
| 51          | 297         | 50           | r                  | p              | 12/ 1/28             | 20.5                | 35.6         | 8.22         | 17              |
| 52          | 300         | 50           | r                  | n              | 12/ 3/28             | 20.2                | 35.6         | 8.20         | 8               |
| 52          | 301         | 100          | r                  | n              | 12/ 3/28             | 18.2                | 35.2         | 8.17         | 8               |
| 52          | 302         | 0            | oc                 | p              | 12/ 3/28             | 22.5                | 35.4         | 8.21         | 8               |
| 53          | 304         | 50           | r                  | n              | 12/ 5/28             | 21.2                | 35.8         | 8.20         | 13              |
| 53          | 305         | 100          | r                  | n              | 12/ 5/28             | 19.9                | 35.6         | 8.19         | 13              |
| 53<br>53-54 | 306         | 0            | r                  | p              | 12/ 5/28<br>12/14/28 | 22.6<br>(23.0       | 35.7<br>35.6 | 8.22<br>8.22 | 13<br>11)       |
| 53-54       | 310<br>311  | 0            | r                  | n<br>n         | 12/14/28             | (23.0               | 35.6         | 8.22         | 111             |
| 53-54       | 313         | Ö            | ř                  | n              | 12/14/28             | (23.0               | 35.6         | 8.22         | 11)             |
| 54          | 320         | 50           | r                  | n              | 12/14/28             | 19.8                | 35.4         | 8.18         | 17              |
| 54          | 321         | 100          | r                  | n              | 12/14/28             | 18.7                | 35.4         | 8.16         | 20              |
| 54          | 322         | 0            | oc                 | p              | 12/14/28             | 23.2                | 35.5         | 8.22         | 9               |
| 55          | 323         | Ö            | r                  | 'n             | 12/16/28             | 20.4                | 34.9         | 8.19         | 12              |
| 55          | 324         | 50           | r                  | n              | 12/16/28             | 18.7                | 35.0         | 8.18         | 12              |
| 55          | 325         | 100          | r ·                | n              | 12/16/28             | 16.7                | 34.9         | 7.17         | 12              |
| 56          | <b>32</b> 8 | 0            | oc                 | n              | 12/18/28             | 20.8                | 34.9         | 8.13         | 9               |
| 56          | 330         | 100          | oc                 | n              | 12/18/28             | 16.6                | 34.8         | 8.11         | 12              |
| 56_         | 331         | 0            | r                  | p              | 12/18/28             | 20.8                | 34.9         | 8.13         | 9               |
| 56-57       | 334         | 0            | С                  | n              | 12/20/28             | (19.0               | 34.5         | 8.14         | 20)             |
| 61-62       | 369         | 0            | С                  | n              | 12/28/28             | (16.9               | 34.0         | 8.05         | 46)<br>46)      |
| 61-62       | 370         | 0            | 00                 | n              | 12/28/28             | (16.9               | 34.0         | 8.05         | 40)             |

Table 24. Distributional and environmental records for Ceratium pulchellum -- Continued

|                |            | Depth          | Relative  | Appa-  | 1                   | Temperature    | Salinity     | r .          | PO                     |
|----------------|------------|----------------|-----------|--------|---------------------|----------------|--------------|--------------|------------------------|
| Station        | Sample     | (m)            | abundance | ratus  | Date                | (°C)           | (0/00)       | pН           | mg/m <sup>3</sup>      |
| 62             | 372        | 50             | oc        | n      | 12/30/28            | 16.2           | 34.3         | 8.10         | 28                     |
| 62             | 373        | 100            | oc        | n      | 12/30/28            | 13.1           | 34.2         | 8.06         | 48                     |
| 62             | 374        | 0              | oc        | р      | 12/30/28            | 19.2           | 34.2         | 8.12         | 32                     |
| 62<br>62-63    | 375<br>377 | 50<br>0        | oc        | p      | 12/30/28<br>1/ 1/29 | 16.2<br>(20.5  | 34.3<br>34.6 | 8.10<br>8.07 | 28<br>21)              |
| 62-63          | 378        | 0              | oc<br>r   | n<br>n | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 63             | 379        | ő              | oc        | n      | 1/ 1/29             | 20.5           | 34.6         | 8.07         | 21                     |
| 63             | 381        | 100            | r         | n      | 1/ 1/29             | 15.6           | 34.6         | 8.08         | 24                     |
| 63             | 382        | 0              | ос        | p      | 1/ 1/29             | 20.5           | 34.6         | 8.07         | 21                     |
| 63<br>63-64    | 384<br>385 | 100<br>0       | r         | p      | 1/ 1/29<br>1/ 1/29  | 15.6<br>(20.5  | 34.6<br>34.6 | 8.08<br>8.07 | 24<br>21)              |
| 63-64          | 386        | 0              | C         | p<br>n | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 63-64          | 387        | Ö              | c         | n      | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 63-64          | 388        | 0              | ос        | n      | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 63             | 389        | 0              | oc        | n      | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 63-64<br>63-64 | 390<br>391 | 0              | oc<br>c   | n<br>n | 1/ 1/29<br>1/ 1/29  | (20.5<br>(20.5 | 34.6<br>34.6 | 8.07<br>8.07 | 21)<br>21)             |
| 63-64          | 392        | ŏ              | oc        | n      | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 63-64          | 393        | Ö              | oc        | n      | 1/ 1/29             | (20.5          | 34.6         | 8.07         | 21)                    |
| 64             | 394        | 0              | oc        | n      | 1/ 3/29             | 20.6           | 34.6         | 8.12         | 21                     |
| 64             | 395        | 50             | r         | n      | 1/ 3/29             | 17.2           | 34.6         | 8.12         | 29                     |
| 64<br>64       | 396<br>397 | 100<br>100     | oc        | n<br>n | 1/ 3/29<br>1/ 3/29  | 15.8<br>15.8   | 34.5<br>34.5 | 8.10<br>8.10 | 32<br>32               |
| 64             | 398        | 0              | c         | p      | 1/ 3/29             | 20.6           | 34.6         | 8.12         | 21                     |
| 64             | 399        | 50             | · oc      | p      | 1/ 3/29             | 17.2           | 34.6         | 8.12         | 29                     |
| 64             | 400        | 100            | r         | p      | 1/3/29              | 15.8           | 34.5         | 8.10         | 32                     |
| 64-65          | 401        | 0              | oc        | n      | 1/ 3/29             | (15.8          | 34.5         | 8.10         | 32)                    |
| 64-65<br>64-65 | 402<br>403 | 0              | oc        | n      | 1/ 3/29<br>1/ 3/29  | (15.8<br>(15.8 | 34.5<br>34.5 | 8.10<br>8.10 | 32)<br>32)             |
| 68             | 422        | 0              | oc        | n<br>p | 1/10/29             | 19.2           | 35.1         | 8.14         | 29                     |
| 84             | 506        | 50             | oc        | n      | 3/4/29              | 27.5           | 36.4         | 8.21         | 24                     |
| 84             | 507        | 0              | r         | p      | 3/4/29              | 27.8           | 36.2         | 8.23         | 24                     |
| 86             | 516        | 0              | r         | n      | 3/ 9/29             | 28.3           | 36.2         | 8.29         | 20                     |
| 86<br>86       | 518<br>519 | 0<br>50        | oc        | p      | 3/ 9/29<br>3/ 9/29  | 28.3<br>27.4   | 36.2<br>36.2 | 8.29<br>8.29 | 20<br>17               |
| 87             | 523        | 0              | r<br>oc   | p<br>p | 3/ 9/29             | 28.3           | 36.2         | 8.29         | 20                     |
| 87             | 525        | 100            | r         | p      | 3/11/29             | 23.9           | 36.0         | 8.23         | 20                     |
| 89             | 528        | 0              | r         | 'n     | 3/23/29             | 28.4           | 35.6         | 8.25         | 21                     |
| 89             | 529        | 50             | oc        | n      | 3/23/29             | 28.6           | 35.8         | 8.27         | 12                     |
| 89<br>90       | 530<br>535 | 0              | r         | p<br>p | 3/23/29<br>3/23/29  | 28.4<br>28.5   | 35.6<br>35.5 | 8.25<br>8.27 | 21<br>21               |
| 90,            | 536        | 50             | r         | p      | 3/23/29             | 28.6           | 35.6         | 8.26         | 21                     |
| 91             | 542        | 0              | r         | p      | 3/23/29             | 28.7           | 35.1         | 8.30         | 21                     |
| 91             | 543        | 50             | r         | p      | 3/27/29             | 28.5           | 35.2         | 8.30         | 24                     |
| 91<br>92       | 544        | 100<br>00      | r         | р      | 3/27/29             | 25.8<br>28.5   | 36.0<br>35.3 | 8.25<br>8.29 | 30<br>28               |
| 93             | 545<br>552 | 0              | r<br>oc   | n<br>p | 3/29/29<br>3/29/29  | 28.7           | 34.7         | 8.29         | 28                     |
| 94             | 558        | 50             | oc        | n      | 4/22/29             | 29.3           | 34.7         | 8.25         | 14                     |
| 95             | 565        | 0              | r         | p      | 4/22/29             | 29.4           | 34.7         | 8.26         | 14                     |
| 95             | 568A       | 0              | r         | n      | 4/24/29             | (29.4          | 34.7         | 8.26         | 14)                    |
| 96<br>101      | 571<br>605 | 0<br>100       | r         | p      | 4/26/29<br>5/ 7/29  | 29.3<br>25.2   | 35.3<br>35.1 | 8.23<br>8.23 | 12<br>8                |
| 101            | 606        | 0              | r         | n<br>p | 5/ 7/29             | 26.3           | 34.7         | 8.24         | 8                      |
| 102            | 610        | 50             | c .       | n      | 5/ 2/29             | 25.8           | 35.0         | 8.24         |                        |
| 102            | 612        | 0              | r         | p      | 5/ 9/29             | 25.8           | 35.0         | 8.24         | 8887555544447757553333 |
| 102            | 614        | 100            | r         | p      | 5/ 9/29             | 25.6           | 35.0         | 8.23         | 8                      |
| 104<br>105     | 624<br>627 | 0<br>50        | r<br>c    | p<br>n | 5/13/29<br>5/15/29  | 26.1<br>26.8   | 35.2<br>34.9 | 8.24<br>8.23 | 5                      |
| 106            | 635        | 100            | c         | n      | 5/17/29             | 25.6           | 35.1         | 8.23         | 5                      |
| 106            | 636        | 0              | r         | p      | 5/17/29             | 27.2           | 35.0         | 8.23         | 5                      |
| 107            | 642        | 0              | oc        | p      | 5/17/29             | 28.0           | 34.4         | 8.23         | 5                      |
| 107            | 643        | 50             | r         | p      | 5/17/29             | 27.9           | 34.4<br>34.4 | 8.23<br>8.23 | 4                      |
| 107<br>108     | 645<br>649 | 50<br>0        | r         | p g    | 5/17/29<br>5/17/29  | 27.9<br>28.4   | 34.4         | 8.25         | 4                      |
| 108            | 651        | 100            | r         | р      | 5/17/29             | 25.2           | 35.0         | 8.23         | 4                      |
| 112            | 677        | 0              | oc        | p      | 5/17/29             | 23.2           | 34.6         | 8.22         | 7                      |
| 135            | 820        | 0              | r         | n,     | 9/14/29             | 23.8           | 35.1         | 8.37         | 7                      |
| 135            | 822        | 100            | oc        | n      | 9/14/29             | 18.7           | 34.8         | 8.34         | 5                      |
| 135            | 824<br>825 | 0<br><b>50</b> | Г         | p      | 9/14/29<br>9/14/29  | 23.8<br>21.5   | 35.1<br>35.0 | 8.37<br>8.37 | 5                      |
| 135<br>135     | 825        | 100            | r         | p<br>p | 9/14/29             | 18.7           | 34.8         | 8.34         | 5                      |
| 136            | 827        | 0              | oc        | n      | 9/16/29             | 24.6           | 35.4         | 8.37         | 3                      |
| 136            | 832        | 0              | r         | p      | 9/16/29             | 24.6           | 35.4         | 8.37         | 3                      |
| 136            | 833        | 50             | r         | p      | 9/16/29             | 21.4           | 35.1         | 8.39         | 3                      |
| 136            | 835        | 100            | r         | p      | 9/16/29             | 21.4           | 35.1<br>35.1 | 8.39<br>8.30 | 5                      |
| 137            | 838        | 100            | Г         | n      | 9/16/29             | 21.5           | 20.1         | 0.30         | 0                      |

Table 24. Distributional and environmental records for Ceratium pulchelium -- Concluded

| Station | Sample | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub> mg/m <sup>3</sup> |
|---------|--------|--------------|--------------------|----------------|----------|---------------------|--------------------|------|-----------------------------------|
| 138     | 843    | 0            | r                  | n              | 9/20/29  | 26.1                | 34.8               | 8.35 | E                                 |
| 138     | 844    | 50           | r                  |                | 9/20/20  | 26.1                | 34.8               | 8.35 | 5                                 |
| 138     | 847    | 0            | r                  | p              | 9/20/29  | 26.1                | 34.8               | 8.35 | 5                                 |
| 141     | 868    | ő            | r                  | p<br>p         | 9/20/29  | 26.1                | 34.8               | 8.35 | 555555557                         |
| 141     | 870    | 50           | r                  | p              | 9/20/29  | 26.1                | 34.8               | 8.35 | 5                                 |
| 142     | 872    | 0            | r                  | n              | 10/ 7/29 | 24.1                | 34.8               | 8.33 | 5                                 |
| 142     | 873    | 50           | r                  | n              | 10/ 7/29 | 21.8                | 34.8               | 8.30 | 5                                 |
| 142     | 876    | 0            | r                  | p              | 10/ 7/29 | 24.1                | 34.8               | 8.33 | 5                                 |
| 142     | 878    | 100          | r                  | p              | 10/ 7/29 | 16.6                | 34.4               | 8.27 | 7                                 |
| 143     | 881    | 0            | С                  | n              | 10/ 9/29 | 22.4                | 34.4               | 8.30 | 6                                 |
| 143     | 883    | 100          | r                  | n              | 10/ 9/29 | 13.8                | 34.1               | 8.30 | 10                                |
| 144     | 886    | 0            | r                  | n              | 10/11/29 | 23.3                | 35.0               | 8.37 |                                   |
| 144     | 887    | 0            | oc                 | p              | 10/11/29 | 23.3                | 35.0               | 8.37 | 6<br>6<br>6<br>6<br>6             |
| 144     | 888    | 50           | r                  | p              | 10/11/29 | 21.1                | 34.7               | 8.33 | 6                                 |
| 145     | 890    | 0            | С                  | n              | 10/13/29 | 22.3                | 34.6               | 8.29 | 6                                 |
| 145     | 891    | 50           | С                  | n              | 10/13/29 | 18.7                | 34.3               | 8.34 | 6                                 |
| 145     | 892    | 100          | oc                 | n              | 10/13/29 | 16.0                | 34.1               | 8.31 | 6                                 |
| 145     | 893    | 0            | oc                 | p              | 10/13/29 | 22.3                | 34.6               | 8.29 | 6                                 |
| 145     | 894    | 50           | r                  | p              | 10/13/29 | 18.7                | 34.3               | 8.34 | 6                                 |
| 145     | 895    | 100          | С                  | p              | 10/13/29 | 16.0                | 34.1               | 8.31 | 6                                 |
| 146     | 897    | 50           | oc                 | n              | 10/15/29 | 22.4                | 34.9               | 8.37 | 6                                 |
| 146     | 900    | 0            | Г                  | p              | 10/15/29 | 22.4                | 34.9               | 8.37 | 6                                 |
| 146     | 901    | 50           | r                  | p              | 10/15/29 | 22.4                | 34.9               | 8.30 | 6                                 |
| 148     | 910    | 0            | oc                 | n              | 10/19/29 | 23.4                | 35.2               |      | ***                               |
| 148     | 911    | 50           | r                  | n              | 10/19/29 | 23.0                | 35.1               |      |                                   |
| 148     | 917    | 0            | r                  | p              | 10/19/29 | 23.4                | 35.2               |      | ***                               |
| 149     | 920    | 0            | r                  | n              | 10/21/29 | 23.5                | 35.0               | 8.34 | 6                                 |
| 149     | 927    | 0            | r                  | p              | 10/21/29 | 23.5                | 35.0               | 8.34 | 6                                 |
| 149     | 928    | 50           | r                  | p              | 10/21/29 | 23.5                | 35.0               | 8.34 | 6                                 |
| 151     | 937    | 0            | r                  | n              | 10/26/29 | 26.0                | 34.0               |      |                                   |
| 151     | 941    | 0            | r                  | p              | 10/26/29 | 26.0                | 34.0               |      |                                   |
| 152     | 946    | 100          | oc                 | n              | 10/26/29 | 11.4                | 34.7               | 7.76 | 75                                |
| 159     | 991    | 50           | r                  | n              | 10/26/29 | 11.4                | 34.7               | 7.76 | 75                                |

Table 25. Distributional and environmental records for Ceratium breve

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date    | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|---------|---------------------|--------------------|------|--------------------------------------|
| 1       | 1      | 0         | r                  | n              | 5/12/28 | 24.0                | 36.2               | 8.16 | 34                                   |
| 2       | 12     | 50        | r                  | n              | 5/18/28 | 20.5                | 36.4               | 8.21 | 46                                   |
| 16      | 103    | ő         | r                  | p              | 8/13/28 | 25.9                | 36.2               | 8.24 | 8                                    |
| 16      | 106    | ŏ         | oc                 | n              | 8/13/28 | 25.9                | 36.2               | 8.24 | 8                                    |
| 16      | 108    | 100       | r                  | n              | 8/13/28 | 19.9                | 36.5               | 8.17 | 13                                   |
| 20-21   | 131    | 0         | c                  | n              | 8/23/28 | (26.6               | 36.3               | 8.32 | 4)                                   |
| 21      | 132    | ŏ         | c                  | p              | 8/24/28 | 26.6                | 36.3               | 8.32 | 4                                    |
| 21      | 134    | 100       | c                  | p              | 8/24/28 | 21.0                | 36.8               | 8.20 | 4                                    |
| 21      | 135    | 0         | oc                 | n              | 8/24/28 | 26.6                | 36.3               | 8.32 | 4                                    |
| 21      | 137    | 100       | oc                 | n              | 8/24/28 | 21.0                | 36.8               | 8.20 | 4 7                                  |
| 22      | 139    | 0         | oc                 | p              | 8/27/28 | 26.7                | 36.0               | 8.26 | 8                                    |
| 22      | 144    | 100       | r                  | n              | 8/27/28 | 17.5                | 36.1               | 7.99 | 123                                  |
| 23      | 145    | 0         | c                  | p              | 8/29/28 | 27.2                | 35.9               | 8.25 | 4                                    |
| 23      | 149    | 50        | r                  | n              | 8/29/28 | 20.9                | 36.0               | 8.14 | 13                                   |
| 23      | 150    | 100       | r                  | n              | 8/29/28 | 16.6                | 36.0               | 8.18 | 75                                   |
| 24      | 151    | 0         | c                  | p              | 8/31/28 | 27.2                | 35.2               | 8.32 | 4                                    |
| 24      | 152    | 50        | r                  | p              | 8/31/28 | 23.1                | 36.0               | 8.14 | 8                                    |
| 24      | 153    | 100       | r                  | p              | 8/31/28 | 15.6                | 35.6               | 7.96 | 99                                   |
| 24      | 154    | 0         | r                  | 'n             | 8/31/28 | 27.2                | 35.2               | 8.32 | 4                                    |
| 24      | 155    | 50        | r                  | n              | 8/31/28 | 23.1                | 36.0               | 8.14 | 8                                    |
| 24      | 156    | 100       | r                  | n              | 8/31/28 | 15.6                | 35.6               | 7.96 | 99                                   |
| 25      | 157    | 0         | c                  | p              | 9/ 3/28 | 27.5                | 35.6               | 8.31 | 5                                    |
| 25      | 160    | 0         | r                  | 'n             | 9/ 3/28 | 27.5                | 35.6               | 8.31 | 5                                    |
| 25      | 161    | 50        | r                  | n              | 9/ 3/28 | 21.5                | 36.0               | 8.22 | 12                                   |
| 25      | 162    | 100       | r                  | n              | 9/ 3/28 | 14.6                | 35.7               | 7.93 | 121                                  |
| 26      | 163    | 0         | oc                 | p              | 9/ 5/28 | 27.6                | 36.0               | 8.30 | 5                                    |
| 26      | 164    | 50        | r                  | p              | 9/ 5/28 | 24.1                | 36.1               | 8.21 | 5                                    |
| 27      | 167    | 0         | r                  | p              | 9/ 7/28 | 27.5                | 36.3               | 8.31 | 4                                    |
| 27      | 172    | 100       | r                  | 'n             | 9/ 7/28 | 17.7                | 36.0               | 8.09 | 46                                   |
| 28      | 175    | 100       | r                  | р              | 9/11/28 | 22.8                | 36.6               | 8.22 | 7                                    |
| 28      | 177    | 50        | r                  | 'n             | 9/11/28 | 26.7                | 36.3               | 8.26 | 4                                    |
| 29      | 179    | 0         | oc                 | р              | 9/13/28 | 27.6                | 36.2               | 8.31 | 3                                    |
| 29      | 182    | 0         | oc                 | n              | 9/13/28 | 27.6                | 36.2               | 8.31 | 3<br>3<br>3                          |
| 29      | 183    | 50        | r                  | n              | 9/13/28 | 27.2                | 36.2               | 8.29 | 3                                    |

Table 25. Distributional and environmental records for Ceratium breve--Continued

| Station        | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|----------------|------------|-----------|--------------------|----------------|----------------------|------------------|--------------------|--------------|--------------------------------------|
| 30             | 188        | 0         | r                  | n              | 9/15/28              | 28.0             | 36.1               | 8.30         | 2                                    |
| 30             | 189        | 50        | c                  | n              | 9/15/28              | 27.8             | 36.1               | 8.29         | 3                                    |
| 30             | 190        | 100       | oc                 | n              | 9/15/28              | 24.1             | 36.4<br>34.4       | 8.10<br>8.27 | 20<br>2                              |
| 31<br>31       | 191<br>193 | 100       | r                  | n<br>n         | 10/ 3/28<br>10/ 3/28 | 28.5<br>23.4     | 36.5               | 8.19         | 28                                   |
| 32             | 194        | 0         | oc                 | n              | 10/ 5/28             | 28.0             | 36.0               | 8.23         | 28<br>2<br>2<br>2<br>4               |
| 32             | 194A       | Ö         | r                  | p              | 10/ 5/28             | 28.0             | 36.0               | 8.23         | 2                                    |
| 32             | 195        | 50        | r                  | n              | 10/ 5/28             | 27.2             | 36.0               | 8.24         | 2                                    |
| 33             | 197A       | 0         | r                  | p              | 10/ 8/28             | 28.5<br>28.5     | 35.6<br>35.9       | 8.23<br>8.28 | 2                                    |
| 34<br>35       | 200<br>205 | 100       | r                  | n<br>n         | 10/ 9/28<br>10/26/28 | 14.4             | 34.9               | 7.88         | 189                                  |
| 35             | 206        | 0         | c                  | p              | 10/26/28             | 27.4             | 29.7               | 8.31         | 15                                   |
| 35             | 207        | 50        | r                  | p              | 10/26/28             | 16.8             | 34.7               | 7.92         | 138                                  |
| 35a            | 208        | 0         | c                  | n              | 10/26/28             | (27.4            | 29.7               | 8.31         | 15)                                  |
| 35-36          | 209        | 0         | С                  | n              | 10/27/28             | (27.4<br>(27.0   | 29.7<br>30.7       | 8.31<br>8.27 | 15)<br>16)                           |
| 35-36<br>35-36 | 211<br>212 | 0         | oc<br>c            | n<br>n         | 10/28/28<br>10/28/28 | 27.0             | 30.7               | 8.27         | 16)                                  |
| 36             | 213        | ő         | oc                 | n              | 10/30/28             | 26.5             | 31.6               | 8.23         | 16                                   |
| 36             | 216        | 0         | oc                 | p              | 10/30/28             | 26.5             | 31.6               | 8.23         | 16                                   |
| 37             | 217        | 0         | oc                 | n              | 11/ 1/28             | 27.1             | 31.7               | 8.28         | 15                                   |
| 37             | 218        | 50        | oc                 | n              | 11/ 1/28             | 18.8<br>15.1     | 34.5<br>34.9       | 8.00<br>7.82 | 121<br>153                           |
| 37<br>37       | 219<br>220 | 100       | 0C                 | n<br>p         | 11/ 1/28<br>11/ 1/28 | 27.1             | 31.7               | 8.28         | 15                                   |
| 39             | 226        | 50        | r                  | n              | 11/ 6/28             | 16.3             | 34.6               | 7.92         | 48                                   |
| 41             | 235        | 0         | r                  | n              | 11/10/28             | 20.4             | 34.2               | 8.11         | 32                                   |
| 41a            | 240        | 0         | oc                 | n              | 11/12/28             | (18.7            | 34.7               | 8.06         | 45)                                  |
| 42             | 241        | 0         | r                  | n              | 11/13/28<br>11/13/28 | 18.7<br>17.2     | 34.7<br>34.9       | 8.06<br>7.99 | 45<br>68                             |
| 42<br>42       | 242<br>243 | 50<br>100 | r                  | n<br>n         | 11/13/28             | 13.8             | 35.0               | 7.91         | 150                                  |
| 43             | 245        | 50        | r                  | n              | 11/15/28             | 17.0             | 34.9               | 7.93         | 80                                   |
| 43             | 247        | 0         | r                  | р              | 11/15/28             | 19.6             | 34.8               | 8.09         | 52                                   |
| 44             | 250        | 0         | С                  | n              | 11/17/28             | 20.7             | 34.9<br>34.9       | 8.03<br>8.04 | 38<br>34                             |
| 44             | 251<br>252 | 50<br>100 | oc<br>oc           | n<br>n         | 11/17/28<br>11/17/28 | 20.4<br>13.8     | 35.0               | 7.85         | 70                                   |
| 44             | 253        | 0         | c                  | p              | 11/17/28             | 20.7             | 34.9               | 8.03         | 38                                   |
| 44             | 254        | 50        | r                  | p              | 11/17/28             | 20.4             | 34.9               | 8.04         | 34                                   |
| 44             | 255        | 100       | r                  | p              | 11/17/28             | 13.8             | 35.0               | 7.85         | 70                                   |
| 45             | 256        | 0         | oc                 | n              | 11/19/28             | 22.4<br>22.4     | 35.3<br>35.2       | 8.12<br>8.13 | 38<br>46                             |
| 45<br>45       | 257<br>258 | 50<br>100 | oc<br>oc           | n<br>n         | 11/19/28<br>11/19/28 | 18.6             | 35.1               | 8.00         | 50                                   |
| 45             | 259        | 0         | oc                 | p              | 11/19/28             | 22.4             | 35.3               | 8.12         | 38                                   |
| 45             | 260        | 50        | r                  | p              | 11/19/28             | 22.4             | 35.2               | 8.13         | 46                                   |
| 46             | 261        | 0         | oc                 | n              | 11/21/28             | 23.3             | 35.3               | 8.16         | 36<br>40                             |
| 46             | 262        | 50        | oc                 | n<br>n         | 11/21/28<br>11/21/28 | 23.2<br>22.5     | 35.3<br>35.4       | 8.16<br>8.17 | 40                                   |
| 46<br>46       | 263<br>264 | 100       | r                  | p              | 11/21/28             | 23.3             | 35.3               | 8.16         | 36                                   |
| 47             | 266        | Ö         | oc                 | 'n             | 11/23/28             | 23.9             | 36.0               | 8.23         | 17                                   |
| 47             | 267        | 50        | oc                 | n              | 11/23/28             | 23.8             | 36.0               | 8.23         | 20                                   |
| 47             | 268        | 100       | oc                 | n              | 11/23/28<br>11/23/28 | 22.7<br>23.9     | 36.2<br>36.0       | 8.23<br>8.23 | 20<br>17                             |
| 47<br>47       | 269<br>270 | 0<br>50   | oc<br>r            | p<br>p         | 11/23/28             | 23.8             | 36.0               | 8.23         | 20                                   |
| 48             | 271        | 0         | oc                 | n              | 11/25/28             | 23.6             | 36.4               | 8.23         | 13                                   |
| 48             | 272        | 50        | ос                 | n              | 11/25/28             | 23.6             | 36.4               | 8.24         | 16                                   |
| 48             | 273        | 100       | r                  | n              | 11/25/28             | 22.7             | 36.3<br>36.2       | 8.26<br>8.27 | 16<br>13                             |
| 49             | 277<br>279 | 0<br>100  | r                  | n<br>n         | 11/27/28<br>11/27/28 | 23.4<br>21.6     | 35.9               | 8.26         | 13                                   |
| 49<br>49       | 280        | 0         | r                  | n<br>p         | 11/27/28             | 23.4             | 36.2               | 8.27         | 13                                   |
| 50             | 284        | 0         | r                  | n              | 11/29/28             | 23.2             | 36.0               | 8.23         | 13                                   |
| 50             | 288        | 50        | r                  | p              | 11/29/28             | 22.0             | 35.9               | 8.23         | 13<br>233                            |
| 70             | 433        | 100       | r                  | n              | 1/13/29<br>1/13/29   | 12.6<br>21.2     | 34.8<br>35.1       | 7.68<br>8.05 | 103                                  |
| 70<br>77       | 434<br>473 | 0         | r                  | p<br>p         | 2/18/29              | 23.7             | 36.0               | 8.19         | 16                                   |
| 77             | 474        | 50        | oc                 | p              | 2/18/29              | 23.5             | 36.0               | 8.19         | 16                                   |
| 78             | 475        | 0         | oc                 | 'n             | 2/20/29              | 24.6             | 36.0               | 8.17         | 32                                   |
| 78             | 476        | 50        | r                  | n              | 2/20/29              | 23.8             | 36.1               | 8.14<br>8.14 | 32<br>34                             |
| 78             | 477        | 100       | oc                 | n              | 2/20/29<br>2/20/29   | 21.9<br>24.6     | 36.2<br>36.0       | 8.17         | 32                                   |
| 78<br>78       | 478<br>479 | 0<br>50   | oc                 | p<br>p         | 2/20/29              | 23.8             | 36.1               | 8.14         | 32                                   |
| 78             | 480        | 100       | r                  | p              | 2/20/29              | 21.9             | 36.2               | 8.14         | 34                                   |
| 79             | 481        | 0         | ос                 | n              | 2/22/29              | 25.2             | 36.0               | 8.17         | 34                                   |
| 79             | 482        | 50        | oc                 | n              | 2/22/29              | 24.5             | 36.1<br>36.2       | 8.17<br>8.13 | 34<br>45                             |
| 79             | 483        | 100       | oc                 | n              | 2/22/29<br>2/22/29   | 21.8<br>25.2     | 36.2               | 8.17         | 34                                   |
| 79             | 484<br>486 | 0         | oc<br>oc           | p<br>n         | 2/24/29              | 26.0             | 35.9               | 8.20         | 36                                   |
| 262.3          | 200        | U         | 00                 | 4.5            | _,, ~ ~              |                  |                    |              |                                      |
| 80<br>80       | 488        | 0         | oc                 | p              | 2/24/29              | 26.0<br>25.9     | 35.9<br>36.0       | 8.20<br>8.19 | 36<br>29                             |

Table 25. Distributional and environmental records for Ceratium breve--Continued

| Station    | Sample     | Depth<br>(m)    | Relative abundance | Appa-<br>ratus | Date               | Temperature (°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub> mg/m <sup>3</sup> |
|------------|------------|-----------------|--------------------|----------------|--------------------|------------------|--------------------|--------------|-----------------------------------|
|            | 490        |                 | 1                  |                | 2 (24 (20          |                  |                    | 0.10         |                                   |
| 80<br>81   | 491        | 100             | oc<br>oc           | p<br>n         | 2/24/29<br>2/26/29 | 23.4<br>26.5     | 36.2<br>35.8       | 8.16<br>8.19 | 32<br>38                          |
| 81         | 492        | 50              | oc                 | n              | 2/26/29            | 26.4             | 35.9               | 8.19         | 38                                |
| 81         | 493        | 0               | r                  | p              | 2/26/29            | 26.5             | 35.8               | 8.19         | 38                                |
| 81         | 494        | 50              | r                  | p              | 2/26/29            | 26.4             | 35.9               | 8.19         | 38                                |
| 82         | 496        | 0               | oc                 | n              | 2/28/29            | 27.2             | 36.3               | 8.21         | 34                                |
| 82<br>82   | 497<br>498 | 50<br>0         | oc<br>r            | n              | 2/28/29<br>2/28/29 | 27.2<br>27.2     | 36.3<br>36.3       | 8.21<br>8.21 | 34<br>34                          |
| 83         | 501        | ŏ               | c                  | p<br>n         | 3/ 2/29            | 27.5             | 36.3               | 8.24         | 29                                |
| 83         | 502        | 50              | oc                 | n              | 3/ 2/29            | 27.4             | 36.5               | 8.24         | 25                                |
| 83         | 503        | 0               | r                  | p              | 3/ 2/29            | 27.5             | 36.3               | 8.24         | 29                                |
| 84         | 505        | 0               | oc                 | n              | 3/ 4/29            | 27.8             | 36.2               | 8.23         | 24                                |
| 84<br>85   | 506<br>510 | 50<br>0         | oc<br>oc           | n              | 3/ 4/29<br>3/ 6/29 | 27.5<br>27.9     | 36.4<br>36.2       | 8.21<br>8.22 | 24<br>40                          |
| 85         | 511        | 50              | r                  | n<br>n         | 3/ 6/29            | 27.8             | 36.2               | 8.22         | 40                                |
| 86         | 515        | Ö               | .oc                | n              | 3/ 8/29            | (28.3            | 36.2               | 8.29         | 20)                               |
| 86         | 516        | 0               | oc                 | n              | 3/ 9/29            | 28.3             | 36.2               | 8.29         | 20                                |
| 87         | 521        | 0               | r                  | n              | 3/11/29            | 27.8             | 36.1               | 8.28         | 17                                |
| 88<br>88   | 526<br>527 | 0<br><b>5</b> 0 | oc                 | n              | 3/21/29            | 28.5             | 35.9               | 8.23         | 16                                |
| 89         | 528        | 0               | r<br>oc            | n<br>n         | 3/21/29<br>3/23/29 | 28.4<br>28.4     | 35.9<br>35.6       | 8.25<br>8.25 | 13<br>21                          |
| 89         | 529        | 50              | r                  | n              | 3/23/29            | 28.6             | 35.8               | 8.27         | 12                                |
| 89         | 530        | 0               | r                  | p              | 3/23/29            | 28.4             | 35.6               | 8.25         | 21                                |
| 89         | 532        | 0               | r                  | n              | 3/23/29            | (28.4            | 35.6               | 8.25         | 21)                               |
| 90         | 533        | 0               | С                  | n              | 3/25/29            | 28.5             | 35.5               | 8.27         | 21                                |
| 90<br>90   | 534<br>535 | 50<br>0         | oc<br>oc           | n              | 3/25/29<br>3/25/29 | 28.6<br>28.5     | 35.6<br>35.5       | 8.26<br>8.27 | 21<br>21                          |
| 91         | 540        | ő               | c                  | p<br>n         | 3/27/29            | 28.7             | 35.1               | 8.30         | 21                                |
| 91         | 541        | 50              | c                  | n              | 3/27/29            | 28.5             | 35.2               | 8.30         | 24                                |
| 91         | 542        | 0               | r                  | p              | 3/27/29            | 28.7             | 35.1               | 8.30         | 21                                |
| 92         | 545        | 0               | oc                 | n              | 3/29/29            | 28.5             | 35.3               | 8.29         | 28                                |
| 92<br>92   | 546<br>548 | 50<br>50        | c                  | n              | 3/29/29            | 28.4             | 35.4               | 8.29         | 28<br>28                          |
| 93         | 550        | 0               | oc                 | p<br>n         | 3/29/29<br>3/31/29 | 28.4<br>28.7     | 35.4<br>34.7       | 8.29<br>8.30 | 28                                |
| 93         | 551        | 50              | c                  | n              | 3/31/29            | 28.5             | 34.8               | 8.30         | 28                                |
| 93         | 552        | 0               | r                  | p              | 3/31/29            | 28.7             | 34.7               | 8.30         | 28                                |
| 94         | 558        | 50              | r                  | n              | 4/22/29            | 29.3             | 34.7               | 8.25         | 14                                |
| 94         | 559        | 100             | r                  | n              | 4/22/29            | 28.5             | 35.6               | 8.21         | 25                                |
| 95<br>95   | 563<br>564 | 50<br>100       | c<br>oc            | n<br>n         | 4/24/29<br>4/24/29 | 29.3<br>28.5     | 34.9<br>35.4       | 8.24<br>8.22 | 16<br>21                          |
| 95         | 566        | 50              | r                  | p              | 4/24/29            | 29.3             | 34.9               | 8.24         | 16                                |
| 95         | 568A       | 0               | oc                 | n              | 4/25/29            | (29.4            | 34.7               | 8.24         | 14)                               |
| 96         | 568        | 0               | С                  | n              | 4/26/29            | 29.3             | 35.3               | 8.26         | 12                                |
| 96         | 569        | 50              | oc                 | n              | 4/26/29            | 29.2             | 35.3               | 8.23         | 12                                |
| 96<br>96   | 570<br>571 | 100             | oc                 | n              | 4/26/29<br>4/26/29 | 28.2<br>29.3     | 35.7<br>35.3       | 8.19<br>8.23 | 25<br>12                          |
| 96         | 572        | 50              | oc<br>r            | p<br>p         | 4/26/29            | 29.2             | 35.3               | 8.23         | 12                                |
| 96         | 573        | 100             | oc                 | p              | 4/26/29            | 28.2             | 35.7               | 8.19         | 25                                |
| 97         | 574        | 0               | С                  | n              | 4/28/29            | 28.3             | 35.2               | 8.16         | 24                                |
| 97         | 575        | 50              | С                  | n              | 4/28/29            | 28.0             | 35.4               | 8.16         | 21                                |
| 97<br>97   | 576<br>578 | 100             | c                  | n              | 4/28/29            | 27.6             | 35.6<br>35.4       | 8.15         | 25<br>21                          |
| 97         | 579        | 50<br>100       | oc<br>r            | p              | 4/28/29<br>4/28/29 | 28.0<br>27.6     | 35.6               | 8.16<br>8.15 | 25                                |
| 98         | 581        | 0               | oc                 | p<br>n         | 4/30/29            | 27.0             | 35.3               | 8.16         | 24                                |
| 98         | 582        | 50              | oc                 | n              | 4/30/29            | 26.9             | 35.3               | 8.16         | 28                                |
| 98         | 583        | 100             | oc                 | n              | 4/30/29            | 26.7             | 35.4               | 8.14         | 32                                |
| 98<br>98   | 585<br>588 | 50<br>100       | r                  | p              | 4/30/29<br>4/30/29 | 26.9<br>26.7     | 35.3<br>35.4       | 8.16<br>8.14 | 28<br>32                          |
| 99         | 589        | 0               | r<br>c             | p<br>n         | 5/ 2/29            | 27.9             | 34.9               | 8.21         | 12                                |
| 99         | 590        | 50              | c                  | n              | 5/ 2/29            | 27.8             | 34.9               | 8.22         | 12                                |
| 99         | 591        | 100             | c                  | n              | 5/ 2/29            | 27.8             | 35.0               | 8.22         | 17                                |
| 99         | 592        | 0               | oc                 | p              | 5/ 2/29            | 27.9             | 34.9               | 8.21         | 12                                |
| 99<br>99   | 593<br>595 | 50<br>0         | oc                 | p              | 5/ 2/29<br>5/ 2/29 | 27.8<br>27.9     | 34.9<br>34.9       | 8.22<br>8.21 | 12<br>12                          |
| 100        | 595<br>596 | 50              | c<br>c             | n<br>n         | 5/ 2/29<br>5/ 4/29 | 27.6             | 34.9               | 8.21         | 10                                |
| 100        | 597        | 100             | c                  | n              | 5/ 4/29            | 27.6             | 34.7               | 8.22         | 12                                |
| 100        | 598        | 0               | oc                 | p              | 5/ 4/29            | 27.7             | 34.7               | 8.21         | 10                                |
| 100        | 599        | 50              | oc                 | p              | 5/ 4/29            | 27.6             | 34.7               | 8.21         | 10                                |
| 100        | 600        | 100             | r                  | p              | 5/ 4/29            | 27.6             | 34.7               | 8.22         | 12                                |
| 100        | 602        | 100             | r                  | p              | 5/ 4/29            | 27.6             | 34.7<br>34.7       | 8.22<br>8.24 | 12<br>8<br>8                      |
| 101<br>101 | 604<br>605 | 50<br>100       | oc<br>r            | n<br>n         | 5/ 7/29<br>5/ 7/29 | 26.2<br>25.2     | 35.1               | 8.23         | 8                                 |
| 102        | 609        | 0               | oc                 | n              | 5/ 9/29            | 25.8             | 35.0               | 8.24         | 8                                 |
| 102        | 610        | 50              | oc                 | n              | 5/ 9/29            | 25.8             | 35.0               | 8.24         | 8                                 |
| 102        | 611        | 100             | oc                 | n              | 5/ 9/29            | 25.6             | 35.0               | 8.23         | 8                                 |
| 103        | 615        | 0               | oc                 | n              | 5/11/29            | 26.0             | 35.0               | 8.25         | 5                                 |

Table 25. Distributional and environmental records for Ceratium breve--Concluded

| Ctation    | Commis              | Depth     | Relative  | Appa-  |                      | Temperature  | Salinity     |              | PO4                                  |
|------------|---------------------|-----------|-----------|--------|----------------------|--------------|--------------|--------------|--------------------------------------|
| Station    | Sample              | (m)       | abundance | ratus  | Date                 | (°C)         | (0/00)       | pH           | mg/m <sup>3</sup>                    |
| 103        | 617                 | 100       | r         | n      | 5/11/29              | 24.8         | 35.2         | 8.25         | 5                                    |
| 104        | 621                 | 0         | r         | n      | 5/13/29              | 26.1         | 35.2         | 8.24         | 7                                    |
| 105        | 627                 | 50        | С         | n      | 5/15/29              | 26.8         | 34.9         | 8.23         | 5                                    |
| 105        | 628<br>6 <b>2</b> 9 | 50<br>100 | oc        | n      | 5/15/29              | 26.8         | 34.9         | 8.23         | 5<br>5<br>5                          |
| 105<br>105 | 630                 | 0         | oc<br>r   | n      | 5/15/29<br>5/15/29   | 25.2<br>26.9 | 35.1<br>34.9 | 8.23<br>8.23 | 5                                    |
| 106        | 633                 | ő         | oc        | p<br>n | 5/17/29              | 27.2         | 35.0         | 8.23         | 5<br>5<br>5<br>5                     |
| 106        | 635                 | 100       | c         | n      | 5/17/29              | 25.6         | 35.1         | 8.23         | 5                                    |
| 106        | 636                 | 0         | r         | р      | 5/17/29              | 27.2         | 35.0         | 8.23         | 5                                    |
| 107        | 639                 | 0         | oc        | ñ      | 5/19/29              | 28.0         | 34.4         | 8.23         | 5                                    |
| 107        | 640                 | 50        | ос        | n      | 5/19/29              | 27.9         | 34.4         | 8.23         | 4                                    |
| 107<br>107 | 641<br>642          | 100       | oc        | n      | 5/19/29              | 26.8         | 34.9         | 8.23<br>8.23 | 11                                   |
| 108        | 646                 | 0         | r<br>oc   | p<br>n | 5/19/29<br>5/27/29   | 28.0<br>28.4 | 34.4<br>35.0 | 8.25         | 5<br>4                               |
| 108        | 648                 | 100       | r         | n      | 5/27/29              | 25.2         | 35.0         | 8.23         | 4                                    |
| Guam       | 652                 | 0         | oc        | n      | 5/ /29               |              |              |              |                                      |
| 109        | 654                 | 0         | oc        | n      | 5/29/29              | 27.4         | 35.0         | 8.23         | 3                                    |
| 109        | 655                 | 50        | oc        | n      | 5/29/29              | 23.1         | 35.0         | 8.22         | 3                                    |
| 111        | 668                 | 0         | r         | n      | 6/ 3/29              | 20.1         | 34.5         | 8.18         | 5                                    |
| 112<br>112 | 674<br>676          | 0<br>100  | c<br>r    | n<br>n | 6/ 5/29<br>6/ 5/29   | 23.2<br>19.8 | 34.6<br>34.7 | 8.22<br>8.20 | g<br>g                               |
| 113        | 680                 | 0         | oc        | n      | 6/25/29              | 24.2         | 34.5         | 8.25         | 5<br>7<br>8<br>5<br>5<br>8<br>5<br>4 |
| 113        | 681                 | 50        | oc        | n      | 6/25/29              | 23.8         | 34.6         | 8.25         | 5                                    |
| 113        | 682                 | 100       | oc        | n      | 6/25/29              | 21.5         | 34.7         | 8.23         | 8                                    |
| 113        | 683                 | 0         | oc        | p      | 6/25/29              | 24.2         | 34.5         | 8.25         | 5                                    |
| 137        | 836                 | 0         | r         | n      | 9/18/29<br>9/22/29   | 25.5         | 35.0         | 8.39         | 4                                    |
| 139<br>139 | 849<br>851          | 0<br>100  | r         | n<br>n | 9/22/29              | 26.7<br>22.4 | 34.8<br>35.2 | 8.34<br>8.28 | 6                                    |
| 140        | 857                 | 50        | r         | n      | 10/ 3/29             | 26.9         | 35.0         | 8.39         | 7                                    |
| 140        | 858                 | 100       | oc        | n      | 10/ 3/29             | 25.5         | 35.0         | 8.34         | 7<br>7<br>7                          |
| 140        | 860                 | 0         | r         | р      | 10/ 3/29             | 26.9         | 35.0         | 8.42         |                                      |
| 140        | 861                 | 100       | r         | p      | 10/ 3/29             | 25.5         | 35.0         | 8.34         | 7<br>5<br>5<br>5                     |
| 141        | 864                 | 0         | r         |        | 10/ 5/29             | 25.9         | 35.2         | 8.34         | 5                                    |
| 141<br>141 | 865<br>868          | 50<br>0   | r         | n      | 10/ 5/29<br>10/ 5/29 | 25.9<br>25.9 | 35.2<br>35.2 | 8.34<br>8.34 | 5                                    |
| 141        | 869                 | 50        | r         | p<br>p | 10/ 5/29             | 24.8         | 35.3         | 8.34         | 5                                    |
| 149        | 920                 | ő         | r         | n      | 10/21/29             | 23.5         | 35.0         | 8.34         | 6                                    |
| 149        | 921                 | 50        | r         | n      | 10/21/29             | 23.3         | 35.0         | 8.37         | 6                                    |
| 150        | 929                 | 0         | c         | n      | 10/23/29             | 25.6         | 34.7         | 8.39         | 7                                    |
| 150        | 930                 | 50        | oc        | n      | 10/23/29             | 22.8         | 34.8         | 8.35         | 10                                   |
| 150<br>151 | 931<br>937          | 100       | r         | n<br>n | 10/23/29<br>10/26/29 | 19.6<br>26.0 | 34.6<br>34.0 | 8.32         | 11                                   |
| 151        | 939                 | 100       | r         |        | 10/26/29             | 12.5         | 34.6         |              | • • •                                |
| 151        | 941                 | 0         | r         | p      | 10/26/29             | 26.0         | 34.0         |              | ***                                  |
| 151        | 942                 | 50        | Г         | p      | 10/26/29             | 18.3         | 34.4         |              | ***                                  |
| 152        | 944                 | 0         | oc        | n      | 10/26/29             | 12.5         | 34.6         |              |                                      |
| 152<br>152 | 945                 | 50        | oc        | n      | 10/27/29             | 14.2<br>27.4 | 34.5<br>33.7 | 7.87<br>8.35 | 53<br>20                             |
| 153        | 948<br>951          | 0         | r<br>oc   | p<br>n | 10/27/29<br>10/29/29 | 28.1         | 34.2         | 8.47         | 7                                    |
| 153        | 952                 | 50        | c         | n      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                                    |
| 153        | 953                 | 100       | oc        | n      | 10/29/29             | 20.5         | 34.7         | 8.28         | 31                                   |
| 153        | 955                 | 0         | r         | p      | 10/29/29             | 28.1         | 34.2         | 8.47         | 7                                    |
| 153        | 956                 | 50        | r         | p      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                                    |
| 154<br>154 | 958<br>959          | 0<br>50   | c         | n      | 10/31/29<br>10/31/29 | 28.3<br>28.2 | 34.2<br>34.2 | 8.39<br>8.40 | 7                                    |
| 154        | 960                 | 100       | oc<br>oc  | n<br>n | 10/31/29             | 25.3         | 34.8         | 7.93         | 21                                   |
| 155        | 965                 | 0         | oc        | n      | 11/ 2/29             | <b>27.</b> 8 | 34.9         | 8.29         | 29                                   |
| 155        | 966                 | 50        | r         | n      | 11/ 2/29             | 27.7         | 34.9         | 8.30         | 30                                   |
| 155        | 967                 | 100       | oc        | n      | 11/ 2/29             | 27.2         | 35.0         | 8.30         | 35                                   |
| 156        | 972                 | 100       | oc        |        | 11/ 4/29             | 27.6         | 35.0         | 8.34         | 28                                   |
| 156<br>157 | 974<br>978          | 100       | oc        |        | 11/ 4/29<br>11/ 6/29 | 26.4<br>27.1 | 35.1<br>35.3 | 8.30<br>8.27 | 48<br>47                             |
| 157        | 979                 | 50        | c<br>oc   | n<br>n | 11/ 6/29             | 27.1         | 35.2         | 8.32         | 60                                   |
| 157        | 980                 | 100       | r         |        | 11/ 6/29             | 26.8         | 35.5         | 8.30         | 64                                   |
| 158        | 983                 | 0         | c         | n      | 11/ 8/29             | 28.2         | 35.6         | 8.34         | 36                                   |
| 158        | 984                 | 50        | oc        | n      | 11/8/29              | 28.2         | 35.6         | 8.39         | 50                                   |
| 158        | 985                 | 100       | oc        | n      | 11/ 8/29             | 27.6         | 35.9         | 8.39         | 48                                   |
| 159        | 990                 | 0         | oc        | n      | 11/11/29             | 28.6         | 35.7         | 8.37         | 15                                   |
| 159        | 991                 | 50        | r         | n      | 11/11/29             | 28.5         | 35.7         | 8.39         | 15                                   |
| 159        | 992<br>1000         | 100       | r         | n      | 11/11/29<br>11/13/29 | 28.0<br>28.6 | 35.7<br>35.6 | 8.37<br>8.37 | 23<br>12                             |
| 160<br>160 | 1000                | 50        | r         |        | 11/13/29             | 28.6         | 35.6         | 8.39         | 15                                   |
| 100        | 1002                | 00        |           | **     | 21/10/40             | 20.0         | 20.0         | 0.00         |                                      |

Table 26. Distributional and environmental records for Ceratium euarcuatum

| Station     | Sample     | Depth (m) | Relative abundance | Appa-  | Date                 | Temperature (°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub> mg/m <sup>3</sup> |
|-------------|------------|-----------|--------------------|--------|----------------------|------------------|--------------------|--------------|-----------------------------------|
| 1           | 1          | 0         | r                  | n      | 5/12/28              | 24.0             | 36.2               | 8.16         | 34                                |
| îь          | 7          | 50        | r                  | n      | 5/16/28              | 22.2             | 36.4               | 8.21         | 39                                |
| 15          | 102        | 100       | r                  | n      | 8/11/28              | 18.4             | 36.4               | 8.20         | 19                                |
| 16          | 103        | 0         | r                  | p      | 8/13/28              | 25.9             | 36.2               | 8.24         | 8                                 |
| 16          | 104        | 50        | r                  | p      | 8/13/28              | 24.4             | 36.4               | 8.23<br>8.23 | 8                                 |
| 16<br>18    | 107<br>118 | 50<br>50  | r<br>oc            | n<br>n | 8/13/28<br>8/17/28   | 24.4<br>22.4     | 36.4<br>36.8       | 8.24         | 8                                 |
| 19          | 121        | 50        | oc                 | p      | 8/20/28              | 25.2             | 37.1               | 8.27         | 5 5 5 5 5 5 5 5 5 5 4             |
| 19          | 123        | 50        | oc                 | 'n     | 8/20/28              | 25.2             | 37.1               | 8.27         | 5                                 |
| 19          | 124        | 100       | r                  | n      | 8/20/28              | 22.4             | 37.0               | 8.25         | 5                                 |
| 20<br>20    | 125<br>126 | 0<br>50   | r                  | p      | 8/22/28<br>8/22/28   | 26.0<br>25.8     | 36.6<br>36.6       | 8.37<br>8.26 | 5                                 |
| 20          | 128        | 0         | c<br>r             | p<br>n | 8/22/28              | 26.0             | 36.6               | 8.37         | 5                                 |
| 20          | 129        | 50        | oc                 | n      | 8/22/28              | 25.8             | 36.6               | 8.26         | 3                                 |
| 20          | 130        | 100       | oc                 | n      | 8/22/28              | 22.6             | 36.7               | 8.19         | 5                                 |
| 21          | 136        | 50        | r                  | n      | 8/24/28              | 24.4             | 36.2               | 8.26         |                                   |
| 21<br>22    | 137<br>143 | 100<br>50 | r                  | n<br>n | 8/24/28<br>8/27/28   | 21.0<br>24.5     | 36.8<br>36.2       | 8.20<br>8.21 | 7<br>9                            |
| 22          | 144        | 100       | r                  | n      | 8/27/28              | 17.5             | 36.1               | 7.99         | 123                               |
| 25          | 161        | 50        | r                  | n      | 9/ 3/28              | 21.5             | 36.0               | 8.22         | 12                                |
| 25          | 162        | 100       | r                  | n      | 9/ 3/28              | 14.6             | 35.7               | 7.93         | 121                               |
| 26          | 163        | 0         | r                  | p      | 9/ 5/28              | 27.6             | 36.0               | 8.30         | 5                                 |
| 27<br>27    | 168<br>171 | 50<br>50  | oc                 | p<br>n | 9/ 7/28<br>9/ 7/28   | 26.0<br>26.0     | 36.2<br>36.2       | 8.30<br>8.30 | 4                                 |
| 27          | 172        | 100       | r                  | n      | 9/ 7/28              | 17.7             | 36.0               | 8.09         | 46                                |
| 28          | 174        | 50        | r                  | p      | 9/11/28              | 26.7             | 36.3               | 8.26         | 4                                 |
| 28          | 183        | 50        | oc                 | n      | 9/11/28              | 26.7             | 36.3               | 8.26         | 4                                 |
| 29          | 184        | 100       | r                  | n      | 9/13/28              | 23.1             | 36.6               | 8.21         | 8                                 |
| 30<br>30    | 186<br>189 | 50<br>50  | oc                 | p      | 9/15/28<br>9/15/28   | 27.8<br>27.8     | 36.1<br>36.1       | 8.29<br>8.29 | 3 3                               |
| 30          | 190        | 100       | oc<br>oc           | n<br>n | 9/15/28              | 24.1             | 36.4               | 8.10         | 20                                |
| 43          | 246        | 100       | r                  | n      | 11/15/28             | 13.6             | 35.0               | 7.90         | 92                                |
| 45          | 256        | 0         | oc                 | n      | 11/19/28             | 22.4             | 35.3               | 8.12         | 38                                |
| 46          | 264        | 0         | r                  | p      | 11/21/28             | 23.3             | 35.3               | 8.16         | 36                                |
| 46<br>48    | 265<br>276 | 50<br>100 | oc<br>r            | p      | 11/21/28<br>11/25/28 | 23.2<br>22.7     | 35.3<br>36.3       | 8.16<br>8.26 | 40<br>16                          |
| 49          | 278        | 50        | r                  | p<br>n | 11/27/28             | 22.6             | 36.1               | 8.26         | 13                                |
| 49          | 281        | 50        | r                  | p      | 11/27/28             | 22.6             | 36.1               | 8.26         | 13                                |
| 50          | 285        | 50        | $\mathbf{r}$       | n      | 11/29/28             | 22.0             | 35.9               | 8.23         | 13                                |
| 50          | 286        | 100       | oc                 | n      | 11/29/28             | 20.5<br>22.0     | 35.7<br>35.9       | 8.22<br>8.23 | 13<br>13                          |
| 50<br>51    | 288<br>295 | 50<br>100 | oc<br>oc           | p<br>n | 11/29/28<br>12/ 1/28 | 20.0             | 35.6               | 8.22         | 17                                |
| 51          | 297        | 50        | r                  | p      | 12/ 1/28             | 20.5             | 35.6               | 8.22         | 17                                |
| 54          | 320        | 50        | oc                 | n      | 12/14/28             | 19.8             | 35.4               | 8.18         | 17                                |
| 54          | 321        | 100       | oc                 | n      | 12/14/28             | 18.7             | 35.4               | 8.16         | 20                                |
| 55<br>55    | 323<br>325 | 100       | r                  | n      | 12/16/28<br>12/16/28 | 20.4<br>16.7     | 34.9<br>34.9       | 8.19<br>7.17 | 12<br>12                          |
| 56          | 329        | 50        | oc<br>oc           | n<br>n | 12/18/28             | 18.5             | 35.1               | 8.14         | 9                                 |
| 56          | 330        | 100       | c                  | n      | 12/18/28             | 16.6             | 34.8               | 8.11         | 12                                |
| 56          | 332        | 50        | oc                 | p      | 12/18/28             | 18.5             | 35.1               | 8.14         | 9                                 |
| 56          | 333        | 100       | r                  | p      | 12/18/28             | 16.6             | 34.8               | 8.11         | 12<br>20                          |
| 56-57<br>57 | 334<br>336 | 0<br>50   | oc<br>oc           | n<br>n | 12/19/28<br>12/20/28 | 19.0<br>15.6     | 34.5<br>34.3       | 8.14<br>8.14 | 21                                |
| 57          | 337        | 100       | oc                 | n      | 12/20/28             | 14.3             | 34.4               | 8.10         | 40                                |
| 57          | 338        | 0         | r                  | p      | 12/20/28             | 19.0             | 34.5               | 8.14         | 20                                |
| 57          | 339        | 50        | r                  | p      | 12/20/28             | 15.6             | 34.3               | 8.14         | 21                                |
| 77          | 472        | 0         | r                  | n      | 2/18/29              | 23.7<br>23.7     | 36.0<br>36.0       | 8.19<br>8.19 | 16<br>16                          |
| 77          | 473<br>474 | 0<br>50   | r<br>c             | p      | 2/18/29<br>2/18/29   | 23.5             | 36.0               | 8.19         | 16                                |
| 78          | 476        | 50        | r                  | p<br>n | 2/20/29              | 23.8             | 36.1               | 8.14         | 32                                |
| 78          | 477        | 100       | oc                 | n      | 2/20/29              | 21.9             | 36.2               | 8.14         | 34                                |
| 78          | 479        | 50        | r                  | p      | 2/20/29              | 23.8             | 36.1               | 8.14         | 34                                |
| 81          | 492<br>494 | 50        | oc                 | n      | 2/26/29<br>2/26/29   | 26.4<br>26.4     | 35.9<br>35.9       | 8.19<br>8.19 | 38<br>38                          |
| 81<br>81    | 494        | 50<br>100 | r                  | p<br>p | 2/26/29              | 23.6             | 36.2               | 8.18         | 36                                |
| 82          | 497        | 50        | oc                 | n      | 2/28/29              | 27.2             | 36.3               | 8.21         | 34                                |
| 82          | 500        | 100       | r                  | p      | 2/28/29              | 24.4             | 36.3               | 8.19         | 34                                |
| 83          | 502        | 50        | oc                 | n      | 3/ 2/29              | 27.4             | 36.5               | 8.24         | 25                                |
| 83          | 504        | 50        | r                  | p      | 3/ 2/29              | 27.4<br>27.5     | 36.5<br>36.4       | 8.24<br>8.21 | 25<br>24                          |
| 84<br>84    | 506<br>508 | 50<br>50  | oc<br>r            | n<br>p | 3/ 4/29<br>3/ 4/29   | 27.5             | 36.4               | 8.21         | 24                                |
| 85          | 511        | 50        | r                  | n      | 3/ 6/29              | 27.8             | 36.2               | 8.22         | 40                                |
| 85          | 513        | 50        | r                  | p      | 3/6/29               | 27.8             | 36.2               | 8.22         | 40                                |
| 86          | 517        | 50        | r                  | n      | 3/ 9/29              | 27.4             | 36.2               | 8.29         | 17<br>17                          |
| 86          | 519        | 50        | r .                | p      | 3/9/29               | 27.4<br>23.9     | 36.2<br>36.0       | 8.29<br>8.23 | 20                                |
| 87          | 525        | 100       | r                  | p      | 3/11/29              | 20.8             | 30.0               | 0.20         | 20                                |

Table 26. Distributional and environmental records for Ceratium euarcuatum--Continued

| Station    | Sample     | Depth (m)       | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|------------|-----------------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 88         | 527        | 50              | r                  | n              | 3/21/29              | 28.4                | 35.9               | 8.25         | 13                                   |
| 89         | 529        | 50              | ос                 | n              | 3/21/29<br>3/23/29   | 28.6                | 35.8               | 8.27         | 12                                   |
| 89         | 531        | 100             | r                  | p              | 3/23/29              | 26.4                | 36.0               | 8.24         | 12                                   |
| 91         | 541        | 50              | oc                 | n              | 3/27/29              | 28.5                | 35.2               | 8.30         | 24                                   |
| 92         | 546        | 50              | oc                 | n              | 3/29/29              | 28.4                | 35.4               | 8.29         | 28                                   |
| 92<br>93   | 548<br>551 | 50<br>50        | r                  | p              | 3/29/29              | 28.4<br>28.5        | 35.4<br>34.8       | 8.29<br>8.30 | 28<br>28                             |
| 93         | 553        | 100             | oc<br>r            | n<br>p         | 3/31/29<br>3/31/29   | 27.6                | 35.8               | 8.27         | 29                                   |
| 95         | 563        | 50              | oc                 | n              | 4/24/29              | 29.3                | 34.9               | 8.24         | 16                                   |
| 95         | 564        | 100             | oc                 | n              | 4/24/29              | 28.5                | 35.4               | 8.22         | 21                                   |
| 95         | 566        | 50              | r                  | р              | 4/24/29              | 29.3                | 34.9               | 8.24         | 16                                   |
| 95         | 567        | 100             | r                  | p              | 4/24/29              | 28.5                | 35.4               | 8.22         | 21                                   |
| 96         | 569        | 50              | oc                 | n              | 4/26/29              | 29.2                | 35.3               | 8.23         | 12                                   |
| 98<br>98   | 583<br>588 | 100<br>0-100    | oc                 | n              | 4/30/29<br>4/30/29   | 26.7<br>26.7        | 35.4<br>35.4       | 8.14<br>8.14 | 32<br>32                             |
| 99         | 589        | 0-100           | oc<br>oc           | p<br>n         | 5/ 2/29              | 27.9                | 34.9               | 8.21         | 12                                   |
| 99         | 592        | ő               | r                  | p              | 5/ 2/29              | 27.9                | 34.9               | 8.21         | 12                                   |
| 99         | 595        | Ŏ               | r                  | n              | 5/ 2/29              | 27.9                | 34.9               | 8.21         | 12                                   |
| 100        | 596        | 50              | oc                 | n              | 5/ 4/29              | 27.6                | 34.7               | 8.21         | 10                                   |
| 100        | 597        | 100             | oc                 | n              | 5/ 4/29              | 27.6                | 34.7               | 8.22         | 12                                   |
| 101        | 604        | 50              | r                  | n              | 5/ 7/29              | 26.2                | 34.7               | 8.24         | 8                                    |
| 102        | 609        | 0               | oc                 | n              | 5/ 9/29              | 25.8<br>25.8        | 35.0               | 8.24         | 8                                    |
| 102<br>103 | 610<br>615 | 50<br>0         | oc<br>r            | n<br>n         | 5/ 9/29<br>5/11/29   | 25.8<br>26.0        | 35.0<br>35.0       | 8.24<br>8.25 | 85557775555555<br>11                 |
| 103        | 616        | 50              | r                  | n              | 5/11/29              | 25.8                | 35.2               | 8.25         | 5                                    |
| 103        | 617        | 100             | oc                 | n              | 5/11/29              | 24.8                | 35.2               | 8.25         | 5                                    |
| 104        | 622        | 50              | oc                 | n              | 5/13/29              | 25.8                | 35.2               | 8.24         | 7                                    |
| 104        | 623        | 100             | ос                 | n              | 5/13/29<br>5/13/29   | 25.3                | 35.3               | 8.21         | 7                                    |
| 104        | 626        | 100             | Г                  | p              | 5/13/29              | 25.3                | 35.3               | 8.21         | 7                                    |
| 105        | 628        | 50              | Г                  | n              | 5/15/29<br>5/15/29   | 26.8                | 34.9               | 8.23         | 5                                    |
| 105        | 629        | 100             | oc                 | n              | 5/15/29 5/17/29      | 25.2<br>27.2        | 35.1<br>35.6       | 8.23<br>8.23 | 5                                    |
| 106<br>106 | 633<br>634 | 0<br><b>5</b> 0 | oc                 | n<br>n         | 5/17/29              | 27.0                | 35.0<br>35.0       | 8.23         | 5                                    |
| 106        | 635        | 100             | c                  | n              | 5/17/29              | 25.6                | 35.1               | 8.23         | 5                                    |
| 106        | 637        | 50              | r                  | p              | 5/17/29              | 27.0                | 35.0               | 8.23         | 5                                    |
| 106        | 638        | 100             | r                  | p              | 5/17/29              | 25.6                | 35.1               | 8.23         | 5                                    |
| 107        | 641        | 100             | oc                 | n              | 5/19/29              | 26.8                | 34.9               | 8.23         | 11                                   |
| 108        | 647        | 50              | oc                 | n              | 5/27/29              | 26.8                | 35.0               | 8.24         | 4                                    |
| 108        | 648        | 100             | c                  | n              | 5/27/29              | 25.2<br>26.8        | 35.0<br>35.0       | 8.23<br>8.24 | 4<br>5<br>3<br>7                     |
| 108<br>109 | 650<br>656 | 50<br>100       | r                  | p              | 5/27/29<br>5/29/29   | 19.4                | 34.8               | 8.18         | 5                                    |
| 109        | 658        | 50              | oc                 | n<br>p         | 5/29/29              | 23.1                | 35.0               | 8.22         | 3                                    |
| 110        | 662        | 50              | r                  | n              | 5/31/29              | 18.4                | 34.8               | 8.16         | 7                                    |
| 112        | 675        | 50              | r                  | n              | 6/ 5/29              | 21.7                | 34.6               | 8.23         | 7 5                                  |
| 113        | 680        | 0               | oc                 | n              | 6/25/29              | 24.2                | 34.5               | 8.25         | 5                                    |
| 132        | 798        | 50              | oc                 | n              | 9/ 8/29              | 17.6                | 33.9               | 8.33         | 19                                   |
| 132        | 799        | 100             | r                  | n              | 9/ 8/29              | 14.3<br>22.7        | 33.4<br>34.7       | 8.30<br>8.47 | 16                                   |
| 133<br>133 | 804<br>805 | 0<br>50         | oc<br>oc           | n<br>n         | 9/10/29<br>9/10/29   | 20.8                | 34.7               | 8.37         | 7 7                                  |
| 133        | 806        | 100             | oc                 | n              | 9/10/29              | 18.4                | 34.8               | 8.31         | 7                                    |
| 133        | 813        | 50              | r                  | p              | 9/10/29              | 20.8                | 34.7               | 8.37         | 7                                    |
| 133        | 814        | 100             | r                  | p              | 9/10/29              | 18.4                | 34.8               | 8.31         | 7                                    |
| 133        | 812        | 0               | r                  | p              | 9/10/29              | 22.7                | 34.7               | 8.47         | 7                                    |
| 134        | 808        | 0               | oc                 | n              | 9/12/29              | 22.9<br>19.8        | 34.7<br>34.6       | 8.34<br>8.34 | 6                                    |
| 134<br>135 | 809<br>821 | 50<br>50        | oc<br>oc           | n              | 9/12/29<br>9/14/29   | 21.5                | 35.0               | 8.37         | 5                                    |
| 135        | 822        | 100             | r                  | n<br>n         | 9/14/29              | 18.7                | 34.8               | 8.34         | 5                                    |
| 135        | 824        | 0               | r                  | p              | 9/14/29              | 23.8                | 35.1               | 8.37         | 7                                    |
| 135        | 825        | 50              | r                  | p              | 9/14/29              | 21.5                | 35.0               | 8.37         | 5                                    |
| 136        | 828        | 50              | С                  | n              | 9/16/29              | 21.4                | 35.1               | 8.39         | 3                                    |
| 136        | 829        | 100             | С                  | n              | 9/16/29              | 18.6                | 35.0               | 8.39         | 3                                    |
| 136        | 833        | 50              | r                  | p              | 9/16/29              | 21.4                | 35.1               | 8.39         | 3                                    |
| 137        | 836        | 0               | 00                 | n              | 9/18/29              | 25.5                | 35.0<br>35.1       | 8.39<br>8.34 | 4                                    |
| 137<br>138 | 837<br>844 | 50<br>50        | oc<br>r            | n<br>n         | 9/18/29<br>9/18/29   | 24.4<br>25.6        | 34.7               | 8.30         | 3                                    |
| 138        | 848        | 50              | oc C               | n<br>p         | 9/10/29              | 25.6                | 34.7               | 8.30         | 3                                    |
| 139        | 850        | 50              | r                  | n              | 9/22/29              | 25.8                | 34.9               | 8.31         | 6                                    |
| 140        | 857        | 50              | r                  | n              | 10/3/29              | 26.9                | 35.0               | 8.39         | 7                                    |
| 141        | 864        | 0               | r                  | n              | 10/ 5/29             | 25.9                | 35.2               | 8.34         | 5                                    |
| 141        | 865        | 50              | oc                 | n              | 10/ 5/29             | 24.8                | 35.3               | 8.34         | 5                                    |
| 141        | 869        | 50              | r                  | p              | 10/ 5/29             | 24.8                | 35.3               | 8.34         | 5                                    |
| 142        | 873        | 50              | c                  | n              | 10/ 7/29             | 21.8                | 34.8<br>34.4       | 8.30<br>8.27 | 7                                    |
| 142        | 874        | 100             | C                  | n              | 10/ 7/29<br>10/ 7/29 | 16.6<br>21.8        | 34.4               | 8.30         | 5                                    |
| 142<br>143 | 877<br>881 | 50<br>0         | r                  | p<br>n         | 10/ 1/29             | 22.4                | 34.4               | 8.30         | 665575333443386755557566             |
|            | 11131      | V               |                    |                |                      |                     |                    |              |                                      |

Table 26. Distributional and environmental records for Ceratium euarcuatum -- Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature (°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|------------------|--------------------|------|--------------------------------------|
| 143     | 883    | 100       | С                  | n              | 10/ 9/29 | 13.8             | 34.1               | 8.30 | 10                                   |
| 143     | 855    | 50        | r                  | p              | 10/ 9/29 | 19.0             | 34.2               | 8.34 | 6                                    |
| 144     | 886    | 0         | c                  | n              | 10/ 9/29 | 23.3             | 35.0               | 8.37 | 6                                    |
| 144     | 887    | ŏ         | oc                 | p              | 10/11/29 | 23.3             | 35.0               | 8.37 | 6                                    |
| 144     | 888    | 50        | r                  | p              | 10/11/29 | 21.1             | 34.7               | 8.33 | 6                                    |
| 145     | 891    | 50        | c                  | n              | 10/13/29 | 18.7             | 34.3               | 8.34 | 6                                    |
| 145     | 894    | 50        | 00                 | p              | 10/13/29 | 18.7             | 34.3               | 8.34 | 6                                    |
| 145     | 895    | 100       | r                  | p              | 10/13/29 | 16.0             | 34.1               | 8.31 | 6                                    |
| 146     | 897    | 50        | oc                 | n              | 10/15/29 | 22.4             | 34.9               | 8.30 | 6 6 6 6 6 6 8 5                      |
| 147     | 903    | 0         | r                  | n              | 10/17/29 | 23.3             | 35.3               | 8.26 | 8                                    |
| 147     | 904    | 50        | oc                 | n              | 10/17/29 | 23.1             | 35.3               | 8.29 | 5                                    |
| 148     | 912    | 100       | oc                 | n              | 10/19/29 | 20.0             | 35.0               |      |                                      |
| 149     | 921    | 50        | oc                 | n              | 10/21/29 | 23.3             | 35.0               | 8.37 | 6                                    |
| 150     | 929    | 0         | r                  | n              | 10/23/29 | 25.6             | 34.7               | 8.39 | 7                                    |
| 150     | 930    | 50        | r                  | n              | 10/23/29 | 22.8             | 34.8               | 8.35 | 10                                   |
| 150     | 931    | 100       | oc                 | P              | 10/23/29 | 19.6             | 34.6               | 8.32 | 11                                   |
| 153     | 952    | 50        | r                  | n              | 10/29/29 | 28.1             | 34.4               | 8.39 | 7                                    |
| 153     | 956    | 50        | r                  | p              | 10/29/29 | 28.1             | 34.4               | 8.39 | 7                                    |
| 154     | 958    | 0         | r                  | n              | 10/31/29 | 28.3             | 34.2               | 8.39 | 7                                    |
| 154     | 959    | 50        | r                  | n              | 10/31/29 | 28.2             | 34.2               | 8.40 | 7                                    |
| 155     | 965    | 0         | oc                 | n              | 11/ 2/29 | 27.8             | 34.9               | 8.29 | 29                                   |
| 156     | 972    | 0         | r                  | n              | 11/ 4/29 | 27.6             | 35.0               | 8.34 | 28                                   |
| 156     | 967    | 100       | oc                 | n              | 11/ 4/29 | 26.4             | 35.1               | 8.30 | 48                                   |
| 156     | 973    | 50        | r                  | n              | 11/ 4/29 | 27.0             | 35.1               | 8.37 | 46                                   |
| 156     | 974    | 100       | r                  | n              | 11/ 4/29 | 26.4             | 35.1               | 8.30 | 48                                   |
| 157     | 978    | 0         | oc                 | n              | 11/6/29  | 27.1             | 35.3<br>35.2       | 8.32 | 47<br>60                             |
| 157     | 979    | 50        | oc                 | n              | 11/ 6/29 | 27.1             | 35.2               | 8.30 | 64                                   |
| 157     | 980    | 100       | oc                 | n              | 11/ 6/29 | 26.8             |                    | 8.34 | 36                                   |
| 158     | 983    | 0<br>100  | c                  | n              | 11/ 8/29 | 28.2<br>27.6     | 35.6<br>35.9       | 8.39 | 48                                   |
| 158     | 985    |           | r                  | n              | 11/8/29  | 28.5             | 35.7               | 8.39 | 15                                   |
| 159     | 991    | 50        | r                  | n              | 11/11/29 | 28.0             | 35.7               | 8.37 | 23                                   |
| 159     | 992    | 100<br>50 | r                  | n              | 11/11/29 | 28.6             | 35.6               | 8.39 | 15                                   |
| 160     | 1002   | อบ        | r                  | n              | 11/13/29 | 20.0             | 33.0               | 0.09 | 10                                   |

Table 27. Distributional and environmental records for Ceratium filicorne

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m3 |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------|
| 48      | 276    | 100       | oc                 | p              | 11/25/28 | 22.7                | 36.3               | 8.26 | 16           |
| 49      | 278    | 50        | oc                 | n              | 11/27/28 | 22.6                | 36.1               | 8.26 | 13           |
| 50      | 286    | 100       | C                  | n              | 11/29/28 | 20.5                | 35.7               | 8.22 | 13           |
| 50      | 289    | 100       | oc                 | р              | 11/29/28 | 20.5                | 35.7               | 8.22 | 13           |
| 50-51   | 290    | 0         | r                  | n              | 11/30/28 | (22.8               | 35.6               | 8.22 | 16)          |
| 51      | 295    | 100       | С                  | n              | 12/ 1/28 | 20.0                | 35.6               | 8.22 | 16           |
| 51      | 298    | 100       | oc                 | p              | 12/ 1/28 | 20.0                | 35.6               | 8.22 | 16           |
| 52      | 301    | 100       | C                  | n              | 12/ 3/28 | 18. <b>2</b>        | 35.2               | 8.17 | 8<br>13      |
| 53      | 305    | 100       | С                  | n              | 12/ 5/28 | 19.9                | 35.6               | 8.19 | 13           |
| 54      | 321    | 100       | oc                 | n              | 12/14/28 | 18.7                | 35.4               | 8.16 | 20           |
| 55      | 325    | 100       | oc                 | n              | 12/16/28 | 16.7                | 34.9               | 7.17 | 12           |
| 56      | 330    | 100       | С                  | n              | 12/18/28 | 16.6                | 34.8               | 8.11 | 12           |
| 56      | 333    | 100       | oc                 | р              | 12/18/28 | 16.6                | 34.8               | 8.11 | 12           |
| 57      | 337    | 100       | С                  | n              | 12/20/28 | 14.3                | 34.4               | 8.10 | 40           |
| 57      | 340    | 100       | oc                 | p              | 12/20/28 | 14.3                | 34.4               | 8.10 | 40           |
| 63      | 380    | 50        | С                  | n              | 1/ 1/29  | 17.0                | 34.6               | 8.08 | 25           |
| 63      | 381    | 100       | r                  | n              | 1/ 1/29  | 15.6                | 34.6               | 8.08 | 25           |
| 63      | 383    | 50        | oc                 | p              | 1/ 1/29  | 17.0                | 34.6               | 8.08 | 25           |
| 63      | 384    | 100       | r                  | p              | 1/ 1/29  | 15.6                | 34.6               | 8.08 | 24           |
| 64      | 396    | 100       | oc                 | n              | 1/ 3/29  | 15.8                | 34.5               | 8.10 | 32           |
| 64      | 399    | 50        | r                  | p              | 1/ 3/29  | 17.2                | 34.6               | 8.12 | 29           |
| 64      | 400    | 100       | oc                 | p              | 1/ 3/29  | 15.8                | 34.5               | 8.10 | 32           |
| 65      | 406    | 50        | oc                 | n              | 1/ 5/29  | 16.5                | 34.5               | 8.10 | 25           |
| 66      | 412    | 100       | oc                 | n              | 1/7/29   | 17.8                | 34.9               | 8.12 | 21           |
| 87      | 525    | 100       | r                  | p              | 3/11/29  | 23.9                | 36.0               | 8.23 | 20           |
| 91      | 544    | 100       | oc                 | p              | 3/27/29  | 25.8                | 36.0               | 8.25 | 30           |
| 93      | 553    | 100       | r                  | p              | 3/31/29  | 27.6                | 35.8               | 8.27 | 29           |

Table 28. Distributional and environmental records for Ceratium symmetricum

| Station 1a   |  |           |                    |                |  |                     |                    |   |  |   |
|--|--|-----------|--------------------|----------------|--|---------------------|--------------------|---|--|---|
|  | Sample   | Depth (m) | Relative abundance | Appa-<br>ratus | Date   | Temperature<br>(°C) | Salinity<br>(0/00) | pН  | PO <sub>4</sub><br>mg/m <sup>3</sup>   | Variety   |
| 1a<br>1b<br>15<br>16<br>16<br>17<br>18<br>18<br>19<br>22<br>23<br>24<br>25<br>29<br>29<br>29<br>29<br>29<br>29<br>29<br>29<br>29<br>29<br>29<br>29<br>29 | Sample  4 5 7 8 99 102 104 107 108 112 113 116 118 119 123 124 130 146 149 152 161 165 172 179 180 183 196 211 214 218 239 243 257 258 259 260 261 262 263 265 266 267 268 277 278 294 295 330 337 340 352 354 373 380 382 383 384 387 388 389 390 |           |                    |                | 5/14/28 5/14/28 5/16/28 5/16/28 8/11/28 8/11/28 8/13/28 8/13/28 8/13/28 8/15/28 8/15/28 8/17/28 8/17/28 8/17/28 8/20/28 8/29/28 8/13/28 9/ 13/28 9/ 13/28 9/ 13/28 9/ 13/28 11/10/28 11/10/28 11/10/28 11/10/28 11/19/28 11/19/28 11/19/28 11/19/28 11/19/28 11/21/28 11/21/28 11/21/28 11/21/28 11/23/28 11/25/28 11/29 1/1/29 1/1/29 1/1/29 1/1/29 1/1/29 1/1/29 1/1/29 |                     |                    | 9H  8.20 8.20 8.21 8.28 8.20 8.23 8.21 8.28 8.21 8.27 8.28 8.21 8.27 8.28 8.21 8.27 8.28 8.21 8.27 8.28 8.21 8.27 8.28 8.21 8.21 8.27 8.28 8.21 8.29 8.10 8.29 8.10 8.29 8.10 8.29 8.10 8.29 8.29 8.11 8.00 8.29 8.29 8.10 8.29 8.20 8.20 8.20 8.20 8.20 8.20 8.20 8.20 | PO4 mg/m3  46) 46) 39) 36) 19 19 8 8 13 12 9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | Variety  or or or or or or co |

Table 28. Distributional and environmental records for Ceratium symmetricum -- Continued

| Station    | Sample             | Depth      | Relative  | Appa-  | Date                 | Temperature  | Salinity     | рН           | PO <sub>4</sub>   | Variety  |
|------------|--------------------|------------|-----------|--------|----------------------|--------------|--------------|--------------|-------------------|----------|
|            | l                  | (m)        | abundance | ratus  |                      | (°C)         | (0/00)       |              | mg/m <sup>3</sup> |          |
| 68         | 421                | 100        | r         | n      | 1/10/29              | 16.5         | 34.8         | 8.13         | 34                | or       |
| 68         | 423                | 50         | r         | p      | 1/10/29              | 18.2         | 35.0         | 8.14         | 29                | or       |
| 69<br>71   | 427<br>439         | 0<br>50    | r         | p<br>n | 1/12/29 2/ 6/29      | 21.1<br>16.7 | 35.2<br>35.1 | 8.12<br>7.90 | 62<br>150         | or       |
| 76         | 469                | 100        | r         | n      | 2/16/29              | 21.2         | 35.8         | 8.12         | 45                | or       |
| 76         | 471                | 50         | r         | p      | 2/16/29              | 22.1         | 35.9         | 8.14         | 42                | or       |
| 78         | 477                | 100        | r         | n      | 2/20/29              | 21.9         | 36.2         | 8.14         | 34                | co       |
| 79<br>79   | 482<br>483         | 50<br>100  | oc<br>oc  | n      | 2/22/29<br>2/22/29   | 24.5         | 36.1         | 8.17         | 34                | or       |
| 79         | 485                | 50         | oc        | n<br>p | 2/22/29              | 21.8<br>24.5 | 36.2<br>36.1 | 8.13<br>8.17 | 45<br>34          | or       |
| 80         | 487                | 50         | r         | 'n     | 2/24/29              | 25.9         | 36.0         | 8.19         | 29                | or       |
| 80         | 489                | 50         | oc        | p      | 2/24/29              | 25.9         | 36.0         | 8.19         | 29                | OF       |
| 80<br>91   | 490<br>541         | 100<br>50  | oc oc     | p      | 2/24/29<br>3/27/29   | 23.4         | 36.2<br>35.2 | 8.16<br>8.30 | 32                | or       |
| 91         | 544                | 100        | oc        | n<br>p | 3/27/29              | 28.5<br>25.8 | 36.0         | 8.25         | 24<br>30          | or       |
| 94         | 559                | 100        | r         | 'n     | 4/22/29              | 28.5         | 35.6         | 8.21         | 25                | sy       |
| 95         | 564                | 100        | oc        | n      | 4/24/29              | 28.5         | 35.4         | 8.22         | 21                | sy       |
| 95<br>99   | 566<br>590         | 50<br>50   | r<br>c    | p      | 4/24/29<br>5/ 2/29   | 29.3<br>27.8 | 34.9<br>34.9 | 8.24<br>8.22 | 16                | sy       |
| 100        | 597                | 100        | oc        | n<br>n | 5/ 4/29              | 27.6         | 34.7         | 8.22         | 12<br>12          | sy       |
| 100        | 600                | 100        | r         | p      | 5/ 4/29              | 27.6         | 34.7         | 8.22         | 12                | co       |
| 101        | 605                | 100        | oc        | n      | 5/ 7/29              | 25.2         | 35.1         | 8.23         | 8                 | sy       |
| 102<br>102 | 611<br>614         | 100<br>100 | r         | n      | 5/ 9/29              | 25.6         | 35.0         | 8.23         | 8                 | or       |
| 103        | 617                | 100        | r         | p<br>n | 5/ 9/29<br>5/11/29   | 25.6<br>24.8 | 35.0<br>35.2 | 8.23<br>8.25 | 8<br>5            | or       |
| 103        | 620                | 100        | oc        | p      | 5/11/29              | 24.8         | 35.2         | 8.25         | 5                 | or       |
| 104        | 623                | 100        | r         | n      | 5/13/29              | 25.3         | 35.3         | 8.21         | 7                 | or       |
| 106<br>106 | 635<br>638         | 100<br>100 | c         | n      | 5/17/29<br>5/17/29   | 25.6         | 35.1<br>35.1 | 8.23         | 5                 | sy       |
| 108        | 648                | 100        | r<br>oc   | p<br>n | 5/27/29              | 25.6<br>25.2 | 35.0         | 8.23<br>8.23 | 5<br>4            | or<br>or |
| 109        | 655                | 50         | ос        | n      | 5/29/29              | 23.1         | 35.0         | 8.22         | 3                 | or       |
| 109        | 656                | 100        | oc        | n      | 5/29/29              | 19.4         | 34.8         | 8.18         | 5                 | or       |
| 109<br>109 | 658<br>659         | 50<br>100  | oc ·      | p      | 5/29/29<br>5/29/29   | 23.1<br>19.4 | 35.0<br>34.8 | 8.22<br>8.18 | 3<br>5            | or       |
| 110        | 663                | 100        | oc        | p<br>n | 5/31/29              | 17.9         | 34.7         | 8.14         | 11                | or       |
| 110        | 665                | 50         | oc        | p      | 5/31/29              | 18.4         | 34.8         | 8.16         | 7                 | Or       |
| 111        | 670                | 100        | r         | n      | 6/ 3/29              | 18.2         | 34.7         | 8.13         | 13                | or       |
| 112<br>112 | 675<br>676         | 50<br>100  | r         | n      | 6/ 5/29              | 21.7<br>19.8 | 34.6<br>34.7 | 8.23<br>8.20 | 7<br>8            | or       |
| 113        | 681                | 50         | oc<br>oc  | n<br>n | 6/ 5/29<br>6/25/29   | 23.8         | 34.6         | 8.25         | 5                 | or       |
| 113        | 682                | 100        | ос        | n      | 6/25/29              | 21.5         | 34.7         | 8.23         | 8                 | or       |
| 113        | 683                | 0          | r         | p      | 6/25/29              | 29.2         | 34.5         | 8.25         | 5                 | or, co   |
| 113<br>113 | 684<br>685         | 50<br>100  | oc        | p      | 6/25/29<br>6/25/29   | 23.8<br>21.5 | 34.6<br>34.7 | 8.25<br>8.23 | 5<br>8            | co       |
| 114        | 687                | 50         | oc        | p<br>n | 6/27/29              | 16.2         | 34.6         | 8.04         | 63                | sy       |
| 114        | 688                | 100        | r         | n      | 6/27/29              | 13.0         | 34.5         | 8.00         | 91                | co       |
| 114        | 690                | 50         | oc        | p      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63                | sy       |
| 115<br>131 | 69 <b>3</b><br>788 | 50<br>0    | r         | n<br>n | 6/29/29<br>9/6/29    | 17.5<br>19.3 | 34.6<br>33.4 | 8.12<br>8.34 | 17                | co       |
| 131        | 789                | 100        | r         | n      | 9/ 6/29              | 12.1         | 33.4         | 8.32         | ***               | co       |
| 132        | 798                | 50         | oc        | n      | 9/ 8/29              | 17.6         | 33.9         | 8.33         | 19                | co       |
| 132<br>132 | 799<br>802         | 100<br>50  | c         | n      | 9/ 8/29<br>9/ 8/29   | 14.3<br>17.6 | 33.4<br>33.9 | 8.30<br>8.33 | 16<br>19          | sy       |
| 132        | 803                | 100        | oc        | p<br>p | 9/ 8/29              | 14.3         | 33.4         | 8.30         | 16                | co<br>sy |
| 133        | 806                | 100        | oc        | n      | 9/10/29              | 18.4         | 34.8         | 8.31         | 7                 | sy, co   |
| 133        | 814                | 100        | r         | р      | 9/10/29              | 18.4         | 34.8         | 8.31         | 7                 | sy       |
| 134<br>134 | 808<br>809         | 0<br>50    | r         | n<br>n | 9/12/29<br>9/12/29   | 22.9<br>19.8 | 34.7<br>34.6 | 8.34<br>8.34 | 6                 | sy<br>sy |
| 134        | 810                | 50         | r         | n      | 9/12/29              | 19.8         | 34.6         | 8.34         | 6                 | sy       |
| 134        | 811                | 100        | oc        | n      | 9/12/29              | 18.1         | 34.6         | 8.34         | 6                 | co       |
| 134<br>135 | 817<br>822         | 100        | r         | p      | 9/12/29              | 18.1         | 34.6         | 8.34         | 6                 | sy       |
| 135        | 822<br>826         | 100<br>100 | oc<br>r   | n<br>p | 9/14/29<br>9/14/29   | 18.7<br>18.7 | 34.8<br>34.8 | 8.34<br>8.34 | 5<br>5<br>3       | sy<br>sy |
| 136        | 829                | 100        | c         | n      | 9/16/29              | 18.6         | 35.0         | 8.39         | 3                 | sy       |
| 136        | 834                | 100        | oc        | p      | 9/16/29              | 18.6         | 35.0         | 8.39         | 3                 | sy       |
| 137        | 838                | 100        | oc        | n      | 9/18/29              | 21.5         | 35.1         | 8.30         | 5                 | sy       |
| 137<br>138 | 841<br>845         | 50<br>100  | oc        | p<br>n | 9/18/29<br>9/20/29   | 24.4<br>22.2 | 35.1<br>34.8 | 8.34<br>8.31 | 4 3               | sy<br>sy |
| 139        | 850                | 50         | r         | n      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6                 | sy       |
| 139        | 851                | 100        | oc        | n ·    | 9/22/29              | 22.4         | 35.2         | 8.28         | 6                 | sy       |
| 139        | 855                | 100        | r         | p      | 9/22/29              | 22.4         | 35.2<br>35.0 | 8.28         | 6                 | sy       |
| 140<br>141 | 858<br>871         | 100<br>100 | oc<br>r   | n<br>p | 10/ 3/29<br>10/ 5/29 | 25.5<br>20.0 | 35.0<br>35.0 | 8.34<br>8.33 | 7 5               | sy<br>sy |
| 142        | 874                | 100        | oc        |        | 10/ 7/29             | 16.6         | 34.4         | 8.27         | 7                 | sy       |
| 143        | 883                | 100        | oc        | n :    | 10/ 9/29             | 13.8         | 34.1         | 8.30         | 10                | co, sy   |
| 144        | 889                | 100        | r         | р :    | 10/11/29             | 16.6         | 34.5         | 8.37         | 6                 | со       |

Table 28. Distributional and environmental records for Ceratium symmetricum--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date      | Temperature (°C) | Salinity<br>(o/oo) | рН    | PO4<br>mg/m <sup>3</sup> | Variety |
|---------|--------|-----------|--------------------|----------------|-----------|------------------|--------------------|-------|--------------------------|---------|
|         |        |           |                    |                | 10.10.100 | 40.8             | 04.0               |       |                          |         |
| 145     | 891    | 50        | oc                 | n              | 10/13/29  | 18.7             | 34.3               | 8.34  | 6                        | or      |
| 145     | 892    | 100       | oc                 | n              | 10/13/29  | 16.0             | 34.1               | 8.31  | 6                        | co      |
| 145     | 894    | 50        | oc                 | p              | 10/13/29  | 18.7             | 34.3               | 8.34  | 6                        | or      |
| 145     | 895    | 100       | Г                  | p              | 10/13/29  | 16.0             | 34.1               | 8.31  | 6                        | co, or  |
| 146     | 897    | 50        | r                  | ñ              | 10/15/29  | 22.4             | 34.9               | 8.30  | 6                        | or, sy  |
| 146     | 898    | 100       | С                  | n              | 10/15/29  | 19.7             | 34.3               | 8.26  | 7                        | co, or  |
| 146     | 901    | 50        | r                  | p              | 10/15/29  | 22.4             | 34.9               | 8.30  | 6                        | or      |
| 147     | 905    | 100       | oc                 | n              | 10/17/29  | 19.2             | 35.0               | 8.29  | 5                        | co, sy  |
| 148     | 912    | 100       | c                  | n              | 10/19/29  | 20.0             | 35.0               |       | ***                      | or, co  |
| 148     | 919    | 100       | r                  | p              | 10/19/29  | 20.0             | 35.0               | ***** |                          | or      |
| 149     | 922    | 100       | 1                  | n              | 10/21/29  | 20.3             | 34.9               | 8.38  | 6                        | co, or  |
|         |        |           | С                  |                | 10/23/29  | 19.6             | 34.6               | 8.32  | 11                       | co, or  |
| 150     | 931    | 100       | r                  | n              |           | 18.3             | 34.4               |       |                          | ,       |
| 151     | 938    | 50        | oc                 | n              | 10/26/29  |                  |                    |       | ***                      | or      |
| 151     | 939    | 100       | r                  | n              | 10/26/29  | 12.5             | 34.6               |       | 0.4                      | Or      |
| 153     | 953    | 100       | oc                 | n              | 10/29/29  | 20.5             | 34.7               | 8.28  | 31                       | or, co  |
| 153     | 957    | 100       | r                  | р              | 10/29/29  | 20.5             | 34.7               | 8.28  | 31                       | or      |

Abbreviations: or=var. orthoceros; sy=var. symmetricum; co=var. coarctatum

Table 29. Distributional and environmental records for Ceratium axiale

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 63      | 384    | 100       | г                  | р              | 1/ 1/29  | 15.6                | 34.6               | 8.08 | 24                                   |
| 64      | 400    | 100       | oc                 | p              | 1/ 3/29  | 15.8                | 34.5               | 8.10 | 32                                   |
| 100     | 600    | 100       | r                  | p              | 5/ 4/29  | 27.6                | 34.7               | 8.22 | 12                                   |
| 115     | 694    | 100       | r                  | n              | 6/29/29  | 15.6                | 34.6               | 8.08 | 27                                   |
| 134     | 810    | 100       | ос                 | n              | 9/12/29  | 18.1                | 34.6               | 8.34 | 6                                    |
| 136     | 829    | 100       | С                  | n              | 9/16/29  | 18.6                | 35.0               | 8.39 | 3                                    |
| 136     | 834    | 100       | oc                 | p              | 9/16/29  | 18.6                | 35.0               | 8.39 | 3                                    |
| 137     | 841    | 50        | r                  | p              | 9/18/29  | 24.4                | 35.1               | 8.34 | 4                                    |
| 140     | 863    | 100       | r                  | p              | 10/ 3/29 | 25.5                | 35.0               | 8.34 | 7                                    |
| 148     | 912    | 100       | С                  | 'n             | 10/19/29 | 20.0                | 35.0               |      |                                      |
| 148     | 917    | 0         | r                  | p              | 10/19/29 | 23.4                | 35.2               |      |                                      |
| 150     | 931    | 100       | r                  | 'n             | 10/23/29 | 19.6                | 34.6               | 8.32 | 11                                   |
| 153     | 957    | 100       | r                  | р              | 10/29/29 | 20.5                | 34.7               | 8.28 | 31                                   |

Table 30. Distributional and environmental records for Ceratium azoricum

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|--------------|--------------------------------------|
| 5a      | 33     | 0         |                    |                | 5/30/28  | (13.7               | 35.8               | 8.17         | 10)                                  |
| 5a      | 34     | 0         | r                  | n<br>n         | 5/30/28  | (13.7               | 35.8               | 8.17         | 19)<br>19)                           |
| 6       | 36     | 50        | oc                 | n              | 5/31/28  | 11.6                | 35.6               | 8.12         | 32                                   |
| 6       | 37     | 100       | oc                 | n              | 5/31/28  | 11.3                | 35.6               | 8.08         | 41                                   |
| 6b      | 45     | 0         | 00                 | n              | 6/ 2/28  | (12.4               | 35.6               | 8.15         | 21)                                  |
| 6b      | 46     | ő         | oc                 | n              | 6/ 2/28  | (12.4               | 35.6               | 8.15         | 21)                                  |
| 7       | 57     | 50        | r                  | n              | 7/13/28  | 8.2                 | 35.2               | 8.03         | 47                                   |
| 22      | 143    | 50        | r                  | n              | 8/27/28  | 24.5                | 36.2               | 8.21         | 9                                    |
| 37      | 220    | 0         | r                  | p              | 11/ 3/28 | 26.5                | 32.9               | 8.33         | 20                                   |
| 40      | 232    | Ō         | r                  | p              | 11/ 8/28 | 22.2                | 33.7               | 8.21         | 24                                   |
| 41      | 236    | 50        | r                  | n              | 11/10/28 | 14.6                | 35.0               | 7.94         | 58                                   |
| 41      | 238    | 0         | r                  | p              | 11/10/28 | 20.4                | 34.2               | 8.11         | 32                                   |
| 41a     | 240    | 0         | r                  | ñ              | 11/12/28 | (19.6               | 34.5               | 8.09         | 39)                                  |
| 42      | 241    | 0         | r                  | n              | 11/13/28 | 18.7                | 34.7               | 8.06         | 45                                   |
| 42      | 242    | 50        | r                  | n              | 11/13/28 | 17.2                | 34.9               | 7.99         | 68                                   |
| 42      | 243    | 100       | oc                 | n              | 11/13/28 | 13.8                | 35.0               | 7.91         | 150                                  |
| 43      | 244    | 0         | oc                 | n              | 11/15/28 | 19.6                | 34.8               | 8.09         | 52                                   |
| 43      | 245    | 50        | oc                 | n              | 11/15/28 | 17.0                | 34.9               | 7.93         | 80                                   |
| 43      | 246    | 100       | oc                 | n              | 11/15/28 | 13.6                | 35.0               | 7.90         | 92                                   |
| 43      | 247    | 0         | r                  | p              | 11/15/28 | 19.6                | 34.8               | 8.09         | 52                                   |
| 43      | 248    | 50        | ос                 | p              | 11/15/28 | 17.0                | 34.9               | 7.93         | 80                                   |
| 43      | 249    | 100       | r                  | p              | 11/15/28 | 13.6                | 35.0               | 7.90         | 92                                   |
| 44      | 250    | 0         | r                  | n              | 11/17/28 | 20.7                | 34.9               | 8.03         | 38                                   |
| 44      | 251    | 50        | r                  | מ              | 11/17/28 | 20.4                | 34.9               | 8.04         | 34                                   |
| 44      | 252    | 100       | r                  | n              | 11/17/28 | 13.8                | 35.0               | 7.85         | 70<br>38                             |
| 44      | 253    | 0         | oc                 | p              | 11/17/28 | 20.7                | 34.9               | 8.03<br>8.04 | 34                                   |
| 44      | 254    | 50        | oc                 | p              | 11/17/28 | 20.4                | 34.9<br>35.0       | 7.85         | 70                                   |
| 44      | 255    | 100       | r                  | p              | 11/17/28 | 13.8                | 33.0               | 1.00         | 10                                   |

Table 30. Distributional and environmental records for Ceratium azoricum--Concluded

| Station    | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date            | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|------------|-----------|--------------------|----------------|-----------------|---------------------|--------------------|--------------|--------------------------------------|
| 45         | 259        | 0         | r                  | р              | 11/19/28        | 22.4                | 35.3               | 8.12         | 38                                   |
| 47         | 269        | ŏ         | r                  | p              | 11/23/28        | 23.9                | 36.0               | 8.23         | 17                                   |
| 47         | 270        | 50        | r                  | p              | 11/23/28        | 23.8                | 36.0               | 8.23         | 20                                   |
| 53-54      | 313        | 0         | r                  | n              | 12/10/28        | (23.0               | 35.6               | 8.22         | 11)                                  |
| 65         | 406        | . 50      | r                  | n              | 1/ 5/29         | 16.5                | 34.5               | 8.10         | 25                                   |
| 65         | 409        | 50        | $\mathbf{r}$       | p              | 1/ 5/29         | 16.5                | 34.5               | 8.10         | 25                                   |
| 65         | 410        | 100       | r                  | p              | 1/ 5/29         | 14.8                | 34.3               | 8.10         | 34                                   |
| 94         | 561        | 50        | r                  | p              | 4/22/29         | 29.3                | 34.7               | 8.25         | 14                                   |
| 96         | 569        | 50        | r                  | n              | 4/26/29         | 29.2                | 35.3               | 8.23         | 12                                   |
| 96         | 571        | 0         | r                  | р              | 4/26/29         | 29.3                | 35.3               | 8.23         | 12                                   |
| 100        | 597        | 100       | r                  | n              | 5/ 4/29         | 27.6                | 34.7               | 8.22         | 12                                   |
| 100        | 598        | 0         | oc                 | p              | 5/ 4/29         | 27.7                | 34.7               | 8.21         | 10                                   |
| 100        | 599        | 50        | oc                 | p              | 5/ 4/29         | 27.6                | 34.7               | 8.21         | 10                                   |
| 100        | 600        | 100       | oc                 | p              | 5/ 4/29         | 27.6                | 34.7               | 8.22         | 12                                   |
| 100        | 602        | 100       | oc                 | р              | 5/ 4/29         | 27.6                | 34.7               | 8.22         | 12                                   |
| 110        | 665        | 50        | r                  | р              | 5/31/29         | 18.4                | 34.8               | 8.16         | 7                                    |
| 127        | 767        | 0         | c                  | n              | 7/23/29         | 13.4                | 32.7               | 8.12         | 43                                   |
| 127        | 768        | 50        | oc                 | n              | 7/23/29         | 10.5                | 32.8               | 8.09         | 56                                   |
| 127        | 769<br>771 | 100<br>50 | oc                 | n              | 7/23/29         | 8.2                 | 32.8               | 8.00         | 72                                   |
| 127<br>127 | 772        | 100       | oc                 | p              | 7/23/29         | 10.5<br>8.2         | 32.8<br>32.8       | 8.09<br>8.00 | 56<br>72                             |
| 129        | 780        | 0         | r                  | p              | 7/23/29 7/27/29 | 16.3                | 33.1               | 8.13         | 25                                   |
| 130        | 781        | 0         | r                  | n<br>n         | 9/ 4/29         | 16.2                | 33.4               | 8.34         | 36                                   |
| 130        | 783        | 100       | oc                 | n              | 9/ 4/29         | 8,8                 | 33.7               | 8.06         | 176                                  |
| 130        | 784        | 0         | oc                 | p              | 9/ 4/29         | 16.2                | 33.4               | 8.34         | 36                                   |
| 130        | 785        | 50        | oc                 | p              | 9/ 4/29         | 11.7                | 33.4               | 8.26         | 83                                   |
| 131        | 789        | 100       | r                  | n              | 9/ 6/29         | 12.1                | 33.4               | 8.32         |                                      |
| 131        | 793        | 0         | r                  | p              | 9/ 6/29         | 19.3                | 33.4               | 8.34         | •••                                  |
| 132        | 799        | 100       | r                  | n              | 9/ 8/29         | 14.3                | 33.4               | 8.30         | 16                                   |
| 151        | 942        | 50        | r                  | p              | 10/26/29        | 18.3                | 34.4               |              |                                      |
| 152        | 945        | 50        | r                  | n              | 10/27/29        | 14.2                | 34.5               | 7.87         | 53                                   |
| 159        | 991        | 50        | r                  | n              | 11/11/29        | 28.5                | 35.7               | 8.39         | 15                                   |

Table 31. Distributional and environmental records for Ceratium petersii

| Station     | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
|-------------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------|
| 55          | 324    | 50        | r                  | n              | 12/16/28 | 18.7                | 35.0               | 8.18 | 12                       |
| 58          | 342    | 50        | oc                 | n              | 12/22/28 | 14.8                | 34.0               | 8.12 | 25                       |
| 58          | 344    | 0         | r                  | р              | 12/22/28 | 17.0                | 34.0               | 8.12 | 20                       |
| 58          | 345    | 50        | г                  | p              | 12/22/28 | 14.8                | 34.0               | 8.12 | 25                       |
| 58          | 346    | 100       | г                  | p              | 12/22/28 | 12.3                | 34.1               | 8.05 | 40                       |
| 61          | 364    | 50        | С                  | 'n             | 12/28/28 | 14.0                | 34.0               | 8.05 | 60                       |
| 61          | 365    | 100       | oc                 | n              | 12/28/28 | 10.8                | 34.0               | 8.03 | 80                       |
| 61          | 366    | 0         | r                  | р              | 12/28/28 | 16.9                | 34.0               | 8.05 | 46                       |
| 61          | 367    | 50        | r                  | p              | 12/28/28 | 14.6                | 34.0               | 8.05 | 60                       |
| 61-62       | 369    | 0         | oc                 | n              | 12/20/28 | (18.1               | 34.1               | 8.09 | 39)                      |
| 70          | 431    | 0         | r                  | n              | 1/13/29  | 21.2                | 35.1               | 8.05 | 103                      |
| 70          | 433    | 100       | r                  | n              | 1/13/29  | 12.6                | 34.8               | 7.68 | 233                      |
| 70          | 434    | 0         | r                  | p              | 1/13/29  | 21.2                | 35.1               | 8.05 | 103                      |
| 128         | 773    | 0         | oc                 | 'n             | 7/25/29  | 16.4                | 33.0               | 8.12 | 29                       |
| <b>12</b> 8 | 777    | 50        | r                  | p.             | 7/25/29  | 11.8                | 33.1               | 8.11 | 29                       |

Table 32. Distributional and environmental records for Ceratium arietinum

| Station  | Sample   | Depth (m) | Relative<br>abundance | Appa-  | Date               | Temperature   | Salinity<br>(0/00) | pН           | PO <sub>4</sub> mg/m <sup>3</sup> | Sub-<br>species |
|----------|----------|-----------|-----------------------|--------|--------------------|---------------|--------------------|--------------|-----------------------------------|-----------------|
| 1        | 1        | 0         | F                     | n      | 5/12/28            | 24.0          | 36.2               | 8.16         | 34                                | ar              |
| Îb<br>1b | 6        | 0<br>50   | r                     | n<br>n | 5/16/28<br>5/16/28 | (22.3<br>22.2 | 36.3<br>36.4       | 8.20<br>8.21 | 46)<br>39                         | ar<br>ar        |
| 1b<br>3  | 17       | 100       | oc<br>c               | n<br>n | 5/16/28<br>5/16/28 | 20.3          | 35.5<br>35.5       | 8.18<br>8.18 | 36<br>36                          | ar<br>bu        |
| 3        | 19<br>20 | 100       | r                     | n<br>n | 5/21/28<br>5/21/28 | 13.6<br>15.5  | 35.9<br>36.1       | 8.10<br>8.15 | 48<br>99                          | bu<br>bu        |
| 6h<br>14 | 55<br>92 | 0<br>50   | oc<br>r               | n<br>p | 7/11/28<br>8/ 9/28 | (10.6<br>15.0 | 35.4<br>35.1       | 8.18<br>8.18 | 28)<br>16                         | bu<br>ar        |
| 14       | 95       | 50        | r                     | n      | 8/ 9/28            | 15.0          | 35.1               | 8.18         | 16                                | ar              |

Table 32. Distributional and environmental records for Ceratium arietinum--Continued

| Table 32. Distributional and environmental records for Ceratium arietinum—Continue |            |            |                    |                |                      |                     |                    |              | itinuea                              |                 |
|--|------------|------------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|-----------------|
| Station  | Sample     | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> | Sub-<br>species |
| 15   | 98         | 50         | 00                 | _              | 0 /11 /90            | 19.8                | 36.5               | 0.91         |                                      |                 |
| 15   | 99         | 100        | oc<br>r            | p<br>p         | 8/11/28<br>8/11/28   | 18.4                | 36.4               | 8.21<br>8.20 | 8<br>19                              | ar<br>ar        |
| 15   | 101        | 50         | r                  | 'n             | 8/11/28              | 19.8                | 36.5               | 8.21         | 8                                    | ar              |
| 15   | 102        | 100        | oc                 | n              | 8/11/28              | 18.4                | 36.4               | 8.20         | 19                                   | ar              |
| 16<br>18   | 108        | 100        | r                  | n              | 8/13/28              | 19.9                | 36.5               | 8.17         | 13                                   | ar              |
| 22   | 116<br>141 | 100<br>100 | r                  | p<br>p         | 8/17/28<br>8/27/28   | 20.4<br>17.5        | 36.8<br>36.1       | 8.21<br>7.99 | 5<br>123                             | ar              |
| 22   | 144        | 100        | r                  | 'n             | 8/27/28              | 17.5                | 36.1               | 7.99         | 123                                  | gr<br>gr        |
| 23   | 146        | 50         | r                  | p              | 8/29/28              | 20.9                | 36.0               | 8.14         | 13                                   | gr              |
| 36   | 215        | 100        | r                  | n              | 10/30/28             | 14.4                | 34.9               | 7.85         | 149                                  | gr              |
| 40<br>40   | 230<br>233 | 50<br>50   | r                  | n              | 11/ 8/28<br>11/ 8/28 | 15.3<br>15.3        | 34.9<br>34.9       | 7.87<br>7.87 | 161<br>161                           | ar              |
| 41   | 239        | 100        | r                  | p<br>p         | 11/10/28             | 14.5                | 35.0               | 7.91         | 152                                  | ar<br>ar        |
| 44   | 254        | 50         | r                  | p              | 11/17/28             | 20.4                | 34.9               | 8.04         | 34                                   | gr              |
| 44   | 255        | 100        | r                  | p              | 11/17/28             | 13.8                | 35.0               | 7.85         | 70                                   | gr              |
| 45<br>45   | 256<br>257 | 0<br>50    | r                  | n              | 11/19/28<br>11/19/28 | 22.4<br>22.4        | 35.3<br>35.2       | 8.12<br>8.13 | 38<br>46                             | ar              |
| 45   | 258        | 100        | oc<br>oc           | n<br>n         | 11/19/28             | 18.6                | 35.2               | 8.00         | 50                                   | ar<br>ar        |
| 45   | 259        | 0          | oc                 | p              | 11/19/28             | 22.4                | 35.3               | 8.12         | 38                                   | ar              |
| 45   | 260        | 50         | r                  | p              | 11/19/28             | 22.4                | 35.2               | 8.13         | 46                                   | ar              |
| 46   | 263        | 100        | r                  | n              | 11/21/28             | 22.5                | 35.4               | 8.17         | 40                                   | ar              |
| 46<br>47   | 265<br>268 | 50<br>100  | r                  | p<br>n         | 11/21/28<br>11/23/28 | 23.2<br>22.7        | 35.3<br>36.2       | 8.16<br>8.23 | 40<br>20                             | ar              |
| 47   | 269        | 0          | r                  | p              | 11/23/28             | 23.9                | 36.0               | 8.23         | 17                                   | ar<br>ar        |
| 47   | 270        | 50         | oc                 | p              | 11/23/28             | 23.8                | 36.0               | 8.23         | 20                                   | ar              |
| 48   | 273        | 100        | oc                 | n              | 11/25/28             | 22.7                | 36.3               | 8.26         | 16                                   | ar              |
| 48   | 274        | 100        | r                  | p              | 11/25/28             | 23.6                | 36.4               | 8.23         | 13                                   | ar              |
| 48<br>49   | 276<br>280 | 0          | r                  | p<br>p         | 11/25/28<br>11/27/28 | 22.7<br>23.4        | 36.3<br>36.2       | 8.26<br>8.27 | 16<br>13                             | ar<br>ar        |
| 57   | 340        | 100        | r                  | · p            | 12/20/28             | 14.3                | 34.4               | 8.10         | 40                                   | ar              |
| <b>5</b> 8   | 345        | 50         | r                  | p              | 12/22/28             | 14.8                | 34.0               | 8.12         | 25                                   | ar              |
| 58   | 346        | 100        | r                  | p              | 12/22/28             | 12.3                | 34.1               | 8.05         | 40                                   | ar              |
| 59<br>59   | 350<br>352 | 100<br>50  | r                  | n              | 12/24/28<br>12/24/28 | 11.4<br>14.0        | 34.1<br>34.0       | 8.03<br>8.08 | 72<br>38                             | ar<br>ar        |
| 59   | 353        | 100        | r                  | p<br>p         | 12/24/28             | 11.4                | 34.1               | 8.03         | 72                                   | ar              |
| 60   | 359        | 0          | r                  | p              | 12/26/28             | (15.0               | 34.0               | 8.07         | 50                                   | ar              |
| 61   | 365        | 100        | a                  | n              | 12/28/28             | 10.8                | 34.0               | 8.03         | 80                                   | ar, bu          |
| 61<br>61   | 367        | 50         | oc                 | p              | 12/28/28             | 14.0                | 34.0               | 8.05         | 60                                   | ar              |
| 61-62  | 368<br>369 | 100<br>0   | r                  | p<br>n         | 12/28/28<br>12/29/28 | 10.8<br>(16.9       | 34.0<br>34.0       | 8.03<br>8.05 | 80<br>46)                            | bu<br>ar        |
| 61-62  | 370        | Ö          | r                  | n              | 12/29/28             | (16.9               | 34.0               | 8.05         | 46)                                  | ar              |
| 62   | 372        | 50         | oc                 | n              | 12/30/28             | 16.2                | 34.3               | 8.10         | 28                                   | bu              |
| 62   | 373        | 100        | r                  | n              | 12/30/28             | 13.1                | 34.2               | 8.06         | 48                                   | ar              |
| 62<br>63   | 376<br>381 | 100<br>100 | r                  | p<br>n         | 12/30/28 1/ 1/29     | 13.1<br>15.6        | 34.2<br>34.6       | 8.06<br>8.08 | 48<br>24                             | ar              |
| 63-64  | 392        | 0 '        | r                  | n              | 1/ 3/29              | 20.5                | 34.6               | 8.07         | 21                                   | ar              |
| 64-65  | 402        | 0          | r                  | n              | 1/4/29               | (20.6               | 34.6               | 8.12         | 21)                                  | bu              |
| 65   | 407        | 100        | r                  | n              | 1/ 5/29              | 14.8                | 34.3               | 8.10         | 34                                   | bu              |
| 65<br>65   | 409<br>410 | 50<br>100  | r                  | p              | 1/ 5/29<br>1/ 5/29   | 16.5<br>14.8        | 34.5<br>34.3       | 8.10<br>8.10 | 25<br>34                             | bu<br>bu        |
| 66   | 412        | 100        | r                  | p<br>n         | 1/ 7/29              | 17.8                | 34.9               | 8.12         | 21                                   | bu              |
| 66   | 413        | 0          | r                  | p              | 1/ 7/29              | 19.4                | 34.7               | 8.10         | 29                                   | bu              |
| 66   | 414        | 50         | r                  | p              | 1/ 7/29              | 17.8                | 34.8               | 8.10         | 29                                   | bu              |
| 66<br>69   | 415<br>427 | 100<br>0   | r                  | p              | 1/ 7/29<br>1/12/29   | 17.8<br>21.1        | 34.9<br>35.2       | 8.12<br>8.12 | 21<br>62                             | bu<br>ar        |
| 70   | 432        | 50         | r                  | p<br>n         | 1/13/29              | 15.4                | 35.0               | 7.88         | 178                                  | ar              |
| 73   | 452        | 100        | r                  | n              | 2/20/29              | 14.7                | 35.0               | 7.80         | 178                                  | bu              |
| 78   | 477        | 100        | r                  | n              | 2/20/29              | 21.9                | 36.2               | 8.14         | 34                                   | ar              |
| 94<br>94   | 559<br>560 | 100        | r                  | n              | 4/22/29<br>4/22/29   | 28.5<br>29.5        | 35.6<br>34.7       | 8.21<br>8.25 | 25<br>14                             | ar              |
| 98   | 581        | 0          | oc                 | p<br>n         | 4/22/29              | 29.5<br>27.0        | 35.3               | 8.16         | 24                                   | ar              |
| 98   | 582        | 50         | oc                 | n              | 4/30/29              | 26.9                | 35.3               | 8.16         | 28                                   | ar              |
| 98   | 584        | 0          | r                  | р              | 4/30/29              | 27.0                | 35.3               | 8.16         | 24                                   | ar              |
| 98<br>101  | 585        | 50         | oc                 | p              | 4/30/29<br>5/ 7/29   | 26.9<br>25.2        | 35.3<br>35.1       | 8.16<br>8.23 | 28<br>8                              | ar              |
| 101  | 605<br>606 | 100<br>0   | r                  | n<br>p         | 5/ 7/29              | 26.3                | 34.7               | 8.24         | 8                                    | ar              |
| 101  | 607        | 50         | oc                 | p              | 5/ 7/29              | 26.2                | 34.7               | 8.24         | 8                                    | ar              |
| 102  | 612        | 0          | r                  | p              | 5/ 9/29              | 25.8                | 35.0               | 8.24         | 8                                    | ar              |
| 102  | 613        | 50         | oc                 | p              | 5/ 9/29              | 25.8                | 35.0               | 8.24         | 8                                    | ar              |
| 104<br>110   | 626<br>663 | 100<br>100 | oc<br>r            | p              | 5/13/29<br>5/31/29   | 25.3<br>17.9        | 35.3<br>34.7       | 8.21<br>8.14 | 7<br>11                              | ar<br>ar        |
| 111  | 668        | 0          | r                  | n<br>n         | 6/ 3/29              | 20.1                | 34.5               | 8.18         | 5                                    | ar              |
| 111  | 669        | 50         | r                  | n              | 6/ 3/29              | 19.4                | 34.6               | 8.17         | 5                                    | ar              |
| 113  | 680        | 0          | · r                | n              | 6/25/29              | 24.2                | 34.5               | 8.25         | 5                                    | ar              |
| 114  | 688        | 100        | oc                 | n              | 6/27/29              | 13.0                | 34.5               | 8.00         | 91                                   | ar              |
| 114  | 690        | 50         | oc                 | p              | 6/27/29              | 16.2                | 34.6               | 8.04         | 63                                   | ar              |

Table 32. Distributional and environmental records for Ceratium arietinum--Concluded

| GA-Al-       | G1     | Depth | Relative  | Appa- |          | Temperature | Salinity |      | PO <sub>4</sub>   | Sub-    |
|--------------|--------|-------|-----------|-------|----------|-------------|----------|------|-------------------|---------|
| Station      | Sample | (m)   | abundance | ratus | Date     | (°C)        | (0/00)   | pН   | mg/m <sup>3</sup> | species |
|              |        | (===) |           |       |          | ( 0)        | (0/00/   |      | mg/m              | Species |
| 115          | 693    | 50    | r         | n     | 6/29/29  | 17.5        | 34.6     | 8.12 | 17                | ar      |
| 115a         | 700    | ő     | r         | n     | 6/30/29  | (18.4       | 34.3     | 8.18 | 4)                | ar      |
| 116          | 703    | 50    | c         | n     | 7/ 1/29  | 10.6        | 33.8     | 8.11 | 23                | ar      |
| 116          | 704    | 100   | oc        | n     | 7/ 1/29  | 6.7         | 33.8     |      |                   | ar      |
| 116          | 706    | 50    | c         | p     | 7/ 1/29  | 10.6        | 33.8     | 8.11 | 23                | ar      |
| 116          | 707    | 100   | r         | p     | 7/ 1/29  | 6.7         | 33.8     | 8.11 | 23                | ar      |
| 117          | 709    | 50    | oc        | 'n    | 7/ 3/29  | 12.5        | 34.2     | 8.06 | 51                | ar      |
| 117          | 710    | 100   | oc        | n     | 7/ 3/29  | 8.8         | 34.1     | 7.98 | 84                | ar      |
| 118          | 716    | 100   | r         | n     | 7/ 5/29  | 6.1         | 33.8     | 7.94 | 114               | bu      |
| 118          | 718    | 50    | r         | р     | 7/ 5/29  | 8.2         | 33.7     | 8.21 | 92                | bu      |
| 119          | 722    | 100   | r         | n     | 7/ 7/29  | 1.6         | 33.2     | 7.85 | 193               | bu      |
| 127          | 767    | 0     | oc        | n     | 7/23/29  | 13.4        | 32.7     | 8.12 | 43                | bu      |
| 127          | 768    | 50    | oc        | n     | 7/23/29  | 10.5        | 32.8     | 8.09 | 56                | bu      |
| 127          | 769    | 100   | r         | n     | 7/23/29  | 8.2         | 32.8     | 8.00 | 72                | bu      |
| 127          | 770    | 0     | r         | p     | 7/23/29  | 13.4        | 32.7     | 8.12 | 43                | bu      |
| 127          | 772    | 100   | r         | р     | 7/23/29  | 13.4        | 32.7     | 8.12 | 43                | bu      |
| 127          | 773    | 0     | oc        | n     | 7/23/29  | 13.4        | 32.7     | 8.12 | 43                | bu      |
| 128          | 774    | 50    | r         | n     | 7/25/29  | 11.8        | 33.1     | 8.11 | 29                | bu      |
| <b>128</b> . | 775    | 100   | С         | n     | 7/25/29  | 10.2        | 33.2     | 8.06 | 46                | ar      |
| 128          | 777    | 50    | r         | p     | 7/25/29  | 11.8        | 33.1     | 8.11 | 29                | bu      |
| <b>12</b> 8  | 778    | 100   | oc        | p     | 7/25/29  | 10.2        | 33.2     | 8.06 | 46                | bu      |
| 130          | 782    | 50    | r         | n     | 9/4/29   | 11.7        | 33.4     | 8.26 | 83                | bu      |
| 130          | 783    | 100   | oc        | n     | 9/ 4/29  | 8.8         | 33.7     | 8.06 | 176               | bu      |
| 131          | 788    | 0     | oc        | n     | 9/6/29   | 19.3        | 33.4     | 8.34 |                   | ar      |
| 131          | 789    | 100   | r         | n     | 9/ 6/29  | 12.1        | 33.4     | 8.32 |                   | ar      |
| 132          | 799    | 100   | r         | n     | 9/ 8/29  | 14.3        | 33.4     | 8.30 | 16                | ar      |
| 132          | 803    | 100   | r         | p     | 9/ 8/29  | 14.3        | 33.4     | 8.30 | 16                | ar      |
| 134          | 815    | 0     | r         | p     | 9/12/29  | 22.9        | 34.7     | 8.34 | 6                 | ar      |
| 135          | 825    | 50    | Г         | p     | 9/14/29  | 21.5        | 35.0     | 8.37 | 5                 | ar      |
| 136          | 828    | 50    | Г         | n     | 9/16/29  | 21.4        | 35.1     | 8.39 | 3                 | ar      |
| 136          | 834    | 100   | Г         | p     | 9/16/29  | 18.6        | 35.0     | 8.39 | 3                 | ar      |
| 148          | 919    | 100   | oc        | p     | 10/19/29 | 20.0        | 35.0     |      | ***               | ar      |
| 150          | 935    | 100   | r         | p     | 10/23/29 | 19.6        | 34.6     | 8.32 | 11.               | ar      |
| 151          | 939    | 100   | r         | n     | 10/26/29 | 12.5        | 34.6     | **** |                   | ar      |
| 152          | 945    | 50    | oc        | n     | 10/27/29 | 14.2        | 34.5     | 7.87 | 53                | ar      |
| 152          | 949    | 50    | r         | p     | 10/27/29 | 14.2        | 34.5     | 7.87 | 53                | ar      |

Abbreviations: ar=subsp. arietinum; bu=subsp. bucephalum; gr=subsp. gracilentum.

Table 33. Distributional and environmental records for Ceratium declinatum

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|--------------------|---------------------|--------------------|------|--------------------------|
| 3       | 20     | 0         | 00                 | -              | 5/21/28            | 15.5                | 36.1               | 8.15 | 99                       |
| 13a     | 88     | ő         | oc                 | n              |                    | (21.2               | 35.2               | 8.18 |                          |
| 13a     | 89     | 0         | r                  | n              | 8/ 8/28<br>8/ 8/28 | (21.2               | 35.2               | 8.18 | 11)<br>11)               |
| 15      | 97     | ő         | r                  | n              | 8/11/28            | 24.8                | 36.4               | 8.21 | 11                       |
| 15      | 98     | 50        | r                  | p              | 8/11/28            | 19.8                | 36.5               | 8.21 | 8                        |
| 15      | 99     | 100       | oc                 | p              | 8/11/28            | 18.4                | 36.4               | 8.20 | 19                       |
| 15      | 101    | 50        | oc                 | p<br>n         | 8/11/28            | 19.8                | 36.5               | 8.21 | 8                        |
| 15      | 102    | 100       | r                  | n              | 8/11/28            | 18.4                | 36.4               | 8.20 | 19                       |
| 17      | 109    | 0         | oc ·               |                | 8/15/28            | 26.2                | 36.6               | 8.29 | 9                        |
| 17      | 110    | 50        | r                  | p<br>p         | 8/15/28            | 21.9                | 36.6               | 8.28 | 12                       |
| 17      | 111    | 0         | oc                 | n              | 8/15/28            | 26.2                | 36.6               | 8.29 | 10                       |
| 17      | 112    | 50        | r                  | n              | 8/15/28            | 21.9                | 36.6               | 8.28 | 9<br>12                  |
| 18      | 114    | 0         | Ĉ                  | p              | 8/17/28            | 27.0                | 37.0               | 8.23 | - 5                      |
| 18      | 115    | 50        | oc                 | p              | 8/17/28            | 22.4                | 36.8               | 8.24 | 5                        |
| 18      | 116    | 100       | oc                 | p              | 8/17/28            | 20.4                | 36.8               | 8.21 | 5                        |
| 18      | 117    | 0         | r                  | n              | 8/17/28            | 27.0                | 37.0               | 8.23 | 5                        |
| 18      | 118    | 50        | ос                 | n              | 8/17/28            | 22.4                | 36.8               | 8.24 | 5                        |
| 19      | 121    | 50        | r                  | p              | 8/20/28            | 25.2                | 37.1               | 8.27 | 5                        |
| 20      | 125    | 0         | r                  | p              | 8/22/28            | 26.0                | 36.6               | 8.37 | 5                        |
| 20      | 126    | 50        | r                  | p              | 8/22/28            | 25.8                | 36.6               | 8.26 | 3                        |
| 20      | 127    | 100       | oc                 | p              | 8/22/28            | 22.6                | 36.7               | 8.19 | 5                        |
| 20      | 130    | 100       | r                  | n              | 8/22/28            | 22.6                | 36.7               | 8.19 | 5                        |
| 20-21   | 131    | 0         | oc                 | n              | 8/23/28            | (26.6               | 36.3               | 8.32 | 5555555555547            |
| 21      | 134    | 100       | c                  | p              | 8/24/28            | 21.0                | 36.8               | 8.20 | 7                        |
| 21      | 136    | 50        | r                  | n              | 8/24/28            | 24.4                | 36.2               | 8.26 | 4 7                      |
| 21      | 137    | 100       | oc                 | n              | 8/24/28            | 21.0                | 36.8               | 8.20 | 7                        |
| 22      | 139    | 0         | oc                 | p              | 8/27/28            | 26.7                | 36.0               | 8.26 | 8                        |
| 22      | 141    | 100       | r                  | p              | 8/27/28            | 17.5                | 36.1               | 7.99 | 123                      |
| 22      | 143    | 50        | oc                 | n              | 8/27/28            | 24.5                | 36.2               | 8.21 | 9                        |
| 22      | 144    | 100       | oc                 | n              | 8/27/28            | 17.5                | 36.1               | 7.99 | 123                      |
| 23      | 145    | 0         | oc                 | p              | 8/29/28            | 27.2                | 35.9               | 8.25 | 4                        |

Table 33. Distributional and environmental records for Ceratium declinatum -- Continued

|                |            |                 | ,                  |                |                      |                  |                    |              |                                      |
|----------------|------------|-----------------|--------------------|----------------|----------------------|------------------|--------------------|--------------|--------------------------------------|
| Station        | Sample     | Depth (m)       | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|                | 440        | 50              |                    | l              | 0.400.400            | 50.0             | 200                | 0.14         |                                      |
| 23<br>24       | 149<br>151 | 50<br>0         | oc<br>r            | n<br>p         | 8/29/28<br>8/31/28   | 20.9<br>27.2     | 36.0<br>35.2       | 8.14<br>8.32 | 13<br>4                              |
| 24             | 152        | 50              | r                  | p              | 8/31/28              | 23.1             | 36.0               | 8.14         | 8                                    |
| 29             | 183        | 50              | r                  | 'n             | 9/13/28              | 27.2             | 36.2               | 8.29         | 3                                    |
| 33             | 197A       | 0               | oc                 | p              | 10/ 8/28             | 28.5             | 35.6               | 8.23         | 4                                    |
| 36             | 216        | 0               | r                  | þ              | 10/30/28             | 26.5             | 31.6               | 8.23<br>8.00 | 16<br>121                            |
| 37<br>37       | 218<br>220 | 50<br>0         | r                  | n<br>p         | 11/ 1/28<br>11/ 1/28 | 18.8<br>27.1     | 34.5<br>31.7       | 8.28         | 15                                   |
| 37             | 221        | 50              | oc                 | p              | 11/ 1/28             | 18.8             | 34.5               | 8.00         | 121                                  |
| 42             | 241        | 0               | r                  | n              | 11/13/28             | 18.7             | 34.7               | 8.06         | 45                                   |
| 43             | 246        | 100             | r                  | n              | 11/15/28             | 13.6             | 35.0               | 7.90         | 92                                   |
| 46             | 263<br>267 | 100<br>50       | r                  | n              | 11/21/28<br>11/23/28 | 22.5<br>23.8     | 35.4<br>36.0       | 8.17<br>8.23 | 40<br>20                             |
| 47<br>47       | 268        | 100             | r                  | n<br>n         | 11/23/28             | 22.7             | 36.2               | 8.23         | 20                                   |
| 47             | 269        | 0               | r                  | p              | 11/23/28             | 23.9             | 36.0               | 8.23         | 17                                   |
| 48             | 271        | 0               | r                  | n              | 11/25/28             | 23.6             | 36.4               | 8.23         | 13                                   |
| 48             | 274        | 0               | ос                 | p              | 11/25/28             | 23.6             | 36.4               | 8.23         | 13                                   |
| 49<br>50       | 280<br>287 | 0               | r                  | p              | 11/27/28<br>11/29/28 | 23.4<br>23.2     | 36.2<br>36.0       | 8.27<br>8.23 | 13<br>13                             |
| 50             | 288        | 50              | oc                 | p<br>p         | 11/29/28             | 22.0             | 35.9               | 8.23         | 13                                   |
| 50-51          | 291        | 0               | r                  | 'n             | 11/30/28             | (22.8            | 35.6               | 8.22         | 16)                                  |
| 50-51          | 292        | 0               | r                  | n              | 11/30/28             | (22.8            | 35.6               | 8.22         | 16)                                  |
| 51<br>51       | 296        | 100             | r                  | p              | 12/ 1/28<br>12/ 1/28 | 22.8<br>20.0     | 35.6<br>35.6       | 8.22<br>8.22 | 16<br>17                             |
| 51<br>52       | 298<br>302 | 100             | r                  | p<br>p         | 12/ 1/28             | 22.5             | 35.4               | 8.21         | 8                                    |
| 53             | 304        | 50              | oc                 | n              | 12/ 5/28             | 21.2             | 35.8               | 8.20         | 13                                   |
| 53             | 306        | 0               | r                  | p              | 12/ 5/28             | 22.6             | 35.7               | 8.22         | 13                                   |
| 54             | 322        | 100             | r                  | p              | 12/14/28             | 23.4             | 35.7<br>34.9       | 8.22<br>7.17 | 9<br>12                              |
| 55<br>56-57    | 325<br>334 | 100             | r<br>oc            | n<br>n         | 12/16/28<br>12/19/28 | 16.7<br>(19.0    | 34.5               | 8.14         | 20)                                  |
| 57             | 335        | ŏ               | r                  | n              | 12/20/28             | 19.0             | 34.5               | 8.14         | 20                                   |
| 57             | 337        | 100             | r                  | n              | 12/20/28             | 14.3             | 34.4               | 8.10         | 40                                   |
| 57             | 338        | 0               | r                  | p              | 12/20/28             | 19.0             | 34.5               | 8.14         | 20                                   |
| 61-62<br>62-63 | 370<br>377 | . 0             | r<br>oc            | n<br>n         | 12/28/28<br>12/31/28 | (16.9<br>(20.5   | 34.0<br>34.6       | 8.05<br>8.07 | 46)<br>21)                           |
| 62-63          | 378        | 0               | oc                 | n              | 12/31/28             | (20.5            | 34.6               | 8.07         | 21)                                  |
| 63             | 379        | 0               | ос                 | n              | 1/ 1/29              | 20.5             | 34.6               | 8.07         | 21                                   |
| 63             | 381        | 100             | r                  | n              | 1/ 1/29              | 15.6             | 34.6               | 8.08         | 24                                   |
| 63<br>63       | 383<br>384 | 50<br>100       | r                  | p              | 1/ 1/29<br>1/ 1/29   | 17.0<br>15.6     | 34.6<br>34.6       | 8.08<br>8.08 | 25<br>24                             |
| 64             | 400        | 100             | r                  | p<br>p         | 1/ 3/29              | 15.8             | 34.5               | 8.10         | 32                                   |
| 65             | 408        | 0               | r                  | p              | 1/ 5/29              | 20.2             | 34.5               | 8.10         | 24                                   |
| 65             | 409        | 50              | г                  | p              | 1/ 5/29              | 16.5             | 34.5               | 8.10         | 25                                   |
| 65<br>66       | 410<br>414 | 100<br>50       | r                  | p              | 1/ 5/29<br>1/ 7/29   | 14.8<br>. 17.8   | 34.3<br>34.8       | 8.10<br>8.10 | 34<br>29                             |
| 67             | 416        | 0               | oc                 | p<br>n         | 1/ 8/29              | 19.3             | 34.9               | 8.11         | 21                                   |
| 67             | 418        | 100             | oc                 | n              | 1/8/29               | 16.2             | 34.6               | 8.05         | 40                                   |
| 68             | 422        | 0               | r                  | p              | 1/10/29              | 19.2             | 35.1               | 8.14         | 29                                   |
| 68<br>73       | 423<br>450 | 50<br>0         | r                  | p              | 1/10/29<br>2/10/29   | 18.2<br>25.3     | 35.0<br>35.4       | 8.14<br>8.21 | 29<br>44                             |
| 73             | 452        | 100             | oc                 | n<br>n         | 2/10/29              | 14.7             | 35.0               | 7.80         | 178                                  |
| 74             | 458        | 100             | r                  | n              | 2/12/29              | 15.4             | 35.1               | 7:80         | 175                                  |
| 79             | 484        | 0               | r                  | p              | 2/22/29              | 25.2             | 36.0               | 8.17         | 34                                   |
| 80<br>81       | 490<br>493 | 100 .<br>0      | r ·                | p              | 2/24/29<br>2/26/29   | 23.4<br>26.5     | 36.2<br>35.8       | 8.16<br>8.19 | 32<br>38                             |
| 81             | 494        | 50              | r                  | p<br>p         | 2/26/29              | 26.4             | 35.9               | 8.19         | 38                                   |
| 82             | 498        | 0               | r                  | p              | 2/28/29              | 27.2             | 36.3               | 8.21         | 34                                   |
| 83             | 501        | 0               | r                  | n              | 3/ 2/29              | 27.5             | 36.3               | 8.24         | 29                                   |
| 84<br>85       | 507<br>510 | 0               | r                  | p<br>n         | 3/ 4/29<br>3/ 6/29   | 27.8<br>27.9     | 36.2<br>36.2       | 8.23<br>8.22 | 24<br>40                             |
| 85             | 511        | 50              | r                  | n              | 3/6/29               | 27.8             | 36.2               | 8.22         | 40                                   |
| 85             | 512        | 0               | r                  | p              | 3/ 6/29              | 27.9             | 36.2               | 8.22         | 40                                   |
| 86             | 516        | 0               | r                  | n              | 3/ 9/29              | 28.3             | 36.2               | 8.29         | 20                                   |
| 86<br>86       | 518<br>519 | 0<br><b>5</b> 0 | oc                 | p              | 3/ 9/29<br>3/ 9/29   | 28.3<br>27.4     | 36.2<br>36.2       | 8.29<br>8.29 | 20<br>17                             |
| 87             | 521        | 0               | r                  | p<br>n         | 3/11/29              | 27.8             | 36.1               | 8.28         | 17                                   |
| 87             | 523        | ő               | oc                 | p              | 3/11/29              | 27.8             | 36.1               | 8.28         | 17                                   |
| 87             | 524        | 50              | ос                 | р              | 3/11/29              | 26.5             | 36.1               | 8.26         | 20                                   |
| 87             | 525        | 100             | r                  | p              | 3/11/29              | 23.9<br>28.4     | 36.0<br>35.6       | 8.23<br>8.25 | 20<br>21                             |
| 89<br>89       | 528<br>530 | 0               | oc                 | n<br>p         | 3/23/29<br>3/23/29   | 28.4             | 35.6               | 8.25         | 21                                   |
| 90             | 534        | 50              | r                  | n              | 3/25/29              | 28.6             | 35.6               | 8.26         | 21                                   |
| 90             | 535        | 0               | oc                 | p              | 3/25/29              | 28.5             | 35.5               | 8.27         | 21                                   |
| 90             | 536        | 50              | oc                 | p              | 3/25/29              | 28.6             | 35.6               | 8.26<br>8.30 | 21<br>21                             |
| 91<br>91       | 542<br>544 | 100             | r<br>oc            | p              | 3/27/29 3/27/29      | 28.7<br>25.8     | 35.1<br>36.0       | 8.25         | 30                                   |
| 91             | 044        | 100             | UC                 | р              | 3/21/28              | 20.0             | 30.0               | 0.20         |                                      |

Table 33. Distributional and environmental records for Ceratium declinatum -- Continued

| Station     | Sample      | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|-------------|-------------|------------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 92          | 548         | 50         | r                  | р              | 3/29/29              | 28.4                | 35.4               | 8.29         | 28                                   |
| 93          | 550         | 0          | r                  | n              | 3/31/29              | 28.7                | 34.7               | 8.30         | 28                                   |
| 93          | 551         | 50         | oc                 | n              | 3/31/29              | 28.5                | 34.8               | 8.30         | 28                                   |
| 93          | 552         | 0          | oc                 | p              | 3/31/29              | 28.7                | 34.7               | 8.30         | 28                                   |
| 95          | 564         | 100        | r                  | n              | 4/24/29              | 28.5                | 35.4               | 8.22<br>8.26 | 21<br>14                             |
| 95          | 565         | 0          | r                  | p              | 4/24/29 4/25/29      | 29.4<br>29.4        | 34.7<br>34.7       | 8.26         | 14                                   |
| 95<br>96    | 568A<br>571 | 0          | oc                 | n              | 4/26/29              | 29.3                | 35.3               | 8.23         | 12                                   |
| 96          | 572         | 50         | oc                 | p<br>p         | 4/26/29              | 29.2                | 35.3               | 8.23         | 12                                   |
| 96          | 573         | 100        | oc                 | p              | 4/26/29              | 28.2                | 35.7               | 8.19         | 25                                   |
| 97          | 576         | 100        | oc                 | n              | 4/28/29              | 27.6                | 35.6               | 8.15         | 25                                   |
| 97          | 577         | 0          | ос                 | p              | 4/28/29              | 28.3                | 35.2               | 8.16         | 24                                   |
| 97          | 578         | 50         | oc                 | p              | 4/28/29              | 28.0                | 35.4               | 8.16         | 21                                   |
| 97          | 579         | 100        | r                  | p              | 4/28/29              | 27.6                | 35.6               | 8.15         | 25                                   |
| 99          | 589         | 0          | r                  | n              | 5/ 2/29              | 27.9                | 34.9               | 8.21         | 12                                   |
| 99          | 591         | 100        | r                  | n              | 5/ 2/29              | 27.8                | 35.0               | 8.22         | 17                                   |
| 99          | 592         | 0          | oc                 | p              | 5/ 2/29              | 27.9<br>27.8        | 34.9<br>34.9       | 8.21<br>8.22 | 12<br>12                             |
| 99          | 593<br>594  | 50<br>100  | r                  | p              | 5/ 2/29<br>5/ 2/29   | 27.8                | 35.0               | 8.22         | 17                                   |
| 99<br>99    | 595         | 0          | r                  | p<br>n         | 5/ 2/29              | 27.9                | 34.9               | 8.21         | 12                                   |
| 100         | 596         | 50         | oc                 | n              | 5/ 4/29              | 27.6                | 34.7               | 8.21         | 10                                   |
| 100         | 597         | 100        | oc                 | n              | 5/ 4/29              | 27.6                | 34.7               | 8.22         | 12                                   |
| 100         | <b>59</b> 8 | 0          | С                  | p              | 5/ 4/29              | 27.7                | 34.7               | 8.21         | 10                                   |
| 100         | 599         | 50         | oc                 | p              | 5/ 4/29              | 27.6                | 34.7               | 8.21         | 10                                   |
| 100         | 602         | 100        | oc                 | p              | 5/ 4/29              | 27.6                | 34.7               | 8.22         | 12                                   |
| 101         | 603         | 0          | oc                 | n              | 5/ 7/29              | 26.3                | 34.7               | 8.24         | 8                                    |
| 101         | 606         | 100        | r                  | p              | 5/ 7/29<br>5/ 9/29   | 26.3<br>25.6        | 34.7<br>35.0       | 8.24<br>8.23 | 8                                    |
| 102<br>102  | 611<br>613  | 100<br>50  | r                  | n              | 5/ 9/29              | 25.8                | 35.0               | 8.24         | 8                                    |
| 103         | 616         | 50         | r                  | p<br>n         | 5/11/29              | 25.8                | 35.2               | 8.25         | 8<br>5<br>5<br>5<br>5<br>5<br>5      |
| 103         | 618         | 0          | oc                 | p              | 5/11/29              | 26.0                | 35.0               | 8.25         | 5                                    |
| 105         | 630         | 0          | · oc               | p              | 5/15/29              | 26.9                | 34.9               | 8.23         | 5                                    |
| 105         | 631         | 50         | ос                 | p              | 5/15/29              | 26.8                | 34.9               | 8.23         | 5                                    |
| 106         | 635         | 100        | r                  | n              | 5/17/29              | 25.6                | 35.1               | 8.23         | 5                                    |
| 106         | 636         | 0          | r                  | p              | 5/17/29              | 27.2                | 35.0               | 8.23         | 5                                    |
| 107         | 639         | 0          | r                  | n              | 5/19/29              | 28.0<br>27.9        | 34.4<br>34.4       | 8.23<br>8.23 | 4                                    |
| 107         | 640<br>641  | 50         | oc                 | n<br>n         | 5/19/29<br>5/19/29   | 26.8                | 34.9               | 8.23         | 11                                   |
| 107<br>107  | 642         | 100        | oc                 | p              | 5/19/29              | 28.0                | 34.4               | 8.23         | 5                                    |
| 107         | 643         | 50         | r                  | p              | 5/19/29              | 27.9                | 34.4               | 8.23         | 4                                    |
| 107         | 644         | 100        | oc                 | p              | 5/19/29              | 26.8                | 34.9               | 8.23         | 11                                   |
| 107         | 645         | 50         | oc                 | p              | 5/19/29              | 27.9                | 34.4               | 8.23         | 4                                    |
| 108         | 649         | 0          | oc                 | p              | 5/27/29              | 28.4                | 35.0               | 8.25         | 4                                    |
| 109         | 658         | 50         | r                  | p              | 5/29/29              | 23.1                | 35.0               | 8.22         | 3                                    |
| 110         | 661         | C          | r                  | n              | 5/31/29              | 23.9                | 34.7               | 8.18         | 5                                    |
| 110         | 663         | 100        | r                  | n              | 5/31/29              | 17.9<br>23.9        | 34.7<br>34.7       | 8.14         | 11<br>5                              |
| 110         | 664         | 0          | oc                 | p              | 5/31/29<br>6/ 3/29   | 20.1                | 34.5               | 8.18         | 5                                    |
| 111·<br>112 | 668<br>677  | ő          | oc<br>oc           | n              | 6/ 5/29              | 23.2                | 34.6               | 8.22         | 7                                    |
| 130         | 787         | 0          | r                  | p<br>n         | 9/ 4/29              | 16.2                | 33.4               | 8.34         | 36                                   |
| 131         | 792         | ŏ          | r                  | p              | 9/ 6/29              | 19.3                | 33.4               | 8.34         |                                      |
| 131         | 793         | Ŏ          | r                  | p              | 9/ 6/29              | 19.3                | 33.4               | 8.34         | ***                                  |
| 132         | 797         | 0          | r                  | n              | 9/ 8/29              | 21.0                | 33.9               | 8.34         | 15                                   |
| 132         | 801         | 0          | oc                 | p              | 9/ 8/29              | 21.0                | 33.9               | 8.34         | 15                                   |
| 134         | 808         | 0          | oc                 | n              | 9/12/29              | 22.9                | 34.7               | 8.34         | 6                                    |
| 134         | 815         | 100        | oc                 | p              | 9/12/29              | 22.9<br>18.1        | 34.7<br>34.6       | 8.34<br>8.34 | 6<br>6                               |
| 134<br>136  | 817<br>829  | 100<br>100 | r                  | p<br>n         | 9/12/29<br>9/16/29   | 18.6                | 35.0               | 8.39         | 3                                    |
| 136         | 832         | 0          | r                  | p              | 9/16/29              | 24.6                | 35.4               | 8.37         | 3                                    |
| 137         | 840         | ŏ          | r                  | p              | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                                    |
| 139         | 854         | 50         | r                  | p              | 9/22/29              | 25.8                | 34.9               | 8.31         | 6                                    |
| 139         | 855         | 100        | r                  | p              | 9/22/29              | 22.4                | 35.2               | 8.28         | 6                                    |
| 140         | 858         | 100        | r                  | n              | 10/ 3/29             | 25.5                | 35.0               | 8.34         | 7                                    |
| 140         | 860         | 0          | r                  | p              | 10/ 3/29             | 26.9                | 35.0               | 8.42         | 7                                    |
| 140         | 861         | 50         | r                  | p              | 10/ 3/29             | 26.9<br>25.5        | 35.0<br>35.0       | 8.39<br>8.34 | 7                                    |
| 140         | 863         | 100        | r                  | p              | 10/ 3/29<br>10/ 5/29 | 25.9                | 35.2               | 8.34         | 5                                    |
| 141<br>141  | 868<br>870  | 0<br>50    | r                  | p              | 10/ 5/29             | 24.8                | 35.3               | 8.34         | 5                                    |
| 141         | 873         | 50         | r                  | p<br>n         | 10/ 3/29             | 21.8                | 34.8               | 8.30         | 7<br>5<br>5<br>5                     |
| 142         | 874         | 100        | r                  | n              | 10/ 7/29             | 16.6                | 34.4               | 8.27         | 7                                    |
| 142         | 876         | 0          | oc                 | p              | 10/ 7/29             | 24.1                | 34.8               | 8.33         | 5 5                                  |
| 142         | 877         | 50         | r                  | p              | 10/ 7/29             | 21.8                | 34.8               | 8.30         | 5                                    |
| 143         | 881         | 0          | r                  | n              | 10/ 9/29             | 22.4                | 34.4               | 8.30         | 6                                    |
| 4 4 4       | 889         | 100        | r                  | р              | 10/11/29             | 16.6                | 34.5               | 8.37         | 6                                    |
| 144<br>146  | 897         | 50         | r                  | n              | 10/15/29             | 22.4                | 34.9               | 8.30         | 6                                    |

Table 33. Distributional and environmental records for Ceratium declinatum -- Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 147     | 908    | 50        | r                  | р              | 10/17/29 | 23.1                | 35.3               | 8.29 | 5                                    |
| 148     | 917    | Õ         | r                  | p              | 10/19/29 | 23.4                | 35.2               |      |                                      |
| 149     | 920    | Ŏ         | r                  | n              | 10/21/29 | 23.5                | 35.0               | 8.34 | 6                                    |
| 149     | 927    | ŏ         | r                  | p              | 10/21/29 | 23.5                | 35.0               | 8.34 | 6                                    |
| 149     | 928    | 50        | r                  | p              | 10/21/29 | 23.3                | 35.0               | 8.37 | 6                                    |
| 150     | 930    | 50        | oc                 | ñ              | 10/23/29 | 22.8                | 34.8               | 8.35 | 10                                   |
| 150     | 931    | 100       | r                  | n              | 10/23/29 | 19.6                | 34.6               | 8.32 | 11                                   |
| 150     | 933    | 0         | ос                 | p              | 10/23/29 | 25.6                | 34.7               | 8.39 | 7                                    |
| 150     | 936    | 100       | r                  | p              | 10/23/29 | 19.6                | 34.6               | 8.32 | 11                                   |
| 151     | 941    | 0         | r                  | p              | 10/26/29 | 26.0                | 34.0               |      |                                      |
| 152     | 948    | 0         | r                  | p              | 10/27/29 | 27.4                | 33.7               | 8.35 | 20                                   |
| 153     | 952    | 50        | r                  | 'n             | 10/29/29 | 28.1                | 34.4               | 8.39 | 7                                    |
| 153     | 956    | 50        | r                  | p              | 10/29/29 | 28.1                | 34.4               | 8.39 | 7                                    |
| 153     | 957    | 100       | r                  | p              | 10/29/29 | 20.5                | 34.7               | 8.28 | 31                                   |
| 155     | 967    | 100       | r                  | n              | 11/ 2/29 | 27.2                | 35.0               | 8.30 | 35                                   |
| 156     | 973    | 50        | r                  | р              | 11/ 4/29 | 27.0                | 35.1               | 8.37 | 46                                   |
| 156     | 974    | 100       | · oc               | 'n             | 11/ 4/29 | 26.4                | 35.1               | 8.30 | 48                                   |
| 157     | 980    | 100       | r                  | n              | 11/ 6/29 | 26.8                | 35.5               | 8.30 | 64                                   |
| 159     | 992    | 100       | r                  | n              | 11/11/29 | 28.0                | 35.7               | 8.37 | 23                                   |
| 160     | 1000   | 0         | r                  | n              | 11/13/29 | 28.6                | 35.6               | 8.37 | 12                                   |
| 160     | 1002   | 50        | r                  | n              | 11/13/29 | 28.6                | 35.6               | 8.39 | 15                                   |

Table 34. Distributional and environmental records for Ceratium gibberum

| Station | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub> mg/m <sup>3</sup> |
|---------|-------------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|-----------------------------------|
| 1       | 1           | 0         | ос                 | n              | 5/12/28  | 24.0                | 36.2               | 8.16 | 34                                |
| 1a      | 1           | ő         | oc                 | n              | 5/14/28  | (22.3               | 36.3               | 8.20 | 46)                               |
| 1a      | 5           | ő         | oc                 | n              | 5/14/28  | 22.3                | 36.3               | 8.20 | 46)                               |
| 1b      | 4<br>5<br>6 | ŏ         | c                  | n              | 5/16/28  | 22.3                | 36.3               | 8.20 | 46)                               |
| 1b      | 7           | 50        | r                  | n              | 5/16/28  | 22.2                | 36.4               | 8.21 | 39)                               |
| 1b      | 8           | 100       | oc                 | n              | 5/16/28  | (20.3               | 35.5               | 8.18 | 36)                               |
| 2       | 12          | 50        | oc                 | n              | 5/18/28  | 20.5                | 36.4               | 8.21 | 46                                |
| 2       | 14          | 0         | r                  | n              | 5/18/28  | 20.5                | 36.4               | 8.23 | 58                                |
| 13a     | 89          | Ö         | r                  | n              | 8/ 8/28  | (21.2               | 35.2               | 8.18 | 11)                               |
| 14      | 90          | Õ         | r                  | n              | 8/ 9/28  | 21.2                | 35.2               | 8.18 | 11'                               |
| 14      | 94          | 100       | r                  | n              | 8/ 9/28  | 14.0                | 35.6               | 8.06 | 34                                |
| 15      | 97          | 0         | oc                 | p              | 8/ 9/28  | 24.8                | 36.4               | 8.21 | 11                                |
| 15      | 98          | 50        | r                  | p              | 8/ 9/28  | 19.8                | 36.5               | 8.21 | 8                                 |
| 15      | 101         | 50        | oc                 | n              | 8/ 9/28  | 19.8                | 36.5               | 8.21 | 8                                 |
| 15      | 102         | 100       | oc                 | n              | 8/ 9/28  | 18.4                | 36.4               | 8.20 | 19                                |
| 16      | 106         | 0         | r                  | n              | 8/13/28  | 25.9                | 36.2               | 8.24 | 8                                 |
| 16      | 108         | 100       | ос                 | n              | 8/13/28  | 19.9                | 36.5               | 8.17 | 13                                |
| 17      | 109         | 0         | r                  | p              | 8/15/28  | 26.2                | 36.6               | 8.29 | , 9                               |
| 17      | 110         | 50        | r                  | p              | 8/15/28  | 21.9                | 36.6               | 8.28 | 12                                |
| 17      | 111         | 0         | r                  | 'n             | 8/15/28  | 26.2                | 36.6               | 8.29 | 9                                 |
| 17      | 112         | 50        | r                  | n              | 8/15/28  | 21.9                | 36.6               | 8.28 | 12                                |
| 18      | 114         | 0         | r                  | p              | 8/17/28  | 27.0                | 37.0               | 8.23 | 5                                 |
| 18      | 115         | 50        | r                  | p              | 8/17/28  | 22.4                | 36.8               | 8.24 | 5                                 |
| 18      | 116         | 100       | r                  | p              | 8/17/28  | 20.4                | 36.8               | 8.21 | 5<br>5<br>5<br>3                  |
| 18      | 117         | 0         | r                  | 'n             | 8/17/28  | 27.0                | 37.0               | 8.23 | 5                                 |
| 20      | 126         | 50        | r                  | р              | 8/22/28  | 25.8                | 36.6               | 8.26 | 3                                 |
| 20      | 130         | 100       | r                  | n              | 8/22/28  | 22.6                | 36.7               | 8.19 | 5                                 |
| 20-21   | 131         | 0         | r                  | n              | 8/23/28  | (26.6               | 36.3               | 8.32 | 4)                                |
| 21      | 134         | 100       | r                  | р              | 8/24/28  | 21.0                | 36.8               | 8.20 | 7 4                               |
| 21      | 135         | 0         | oc                 | n              | 8/24/28  | 26.6                | 36.3               | 8.32 | 4                                 |
| 21      | 137         | 100       | r                  | n              | 8/24/28  | 21.0                | 36.8               | 8.20 | 7                                 |
| 23      | 145         | 0         | r                  | p              | 8/29/28  | 27.2                | 35.9               | 8.25 | 4                                 |
| 23      | 149         | 50        | r                  | n              | 8/29/28  | 20.9                | 36.0               | 8.14 | 13                                |
| 23      | 150         | 100       | r                  | n              | 8/29/28  | 16.6                | 36.0               | 8.18 | 13<br>75                          |
| 24      | 151         | 0         | r                  | p              | 8/31/28  | 27.2                | 35.2               | 8.32 | 4                                 |
| 24      | 155         | 50        | r                  | n              | 8/31/28  | 23.1                | 36.0               | 8.14 | 8                                 |
| 24      | 156         | 100       | r                  | n              | 8/31/28  | 15.6                | 35.6               | 7.96 | 99                                |
| 25      | 157         | 0         | oc                 | n              | 9/ 3/28  | 27.5                | 35.6               | 8.31 | 5<br>5                            |
| 25      | 160         | 0         | r                  | n              | 9/ 3/28  | 27.5                | 35.6               | 8.31 | 5                                 |
| 25      | 161         | 50        | r                  | n              | 9/ 3/28  | 21.5                | 36.0               | 8.22 | 12                                |
| 26      | 164         | 50        | r                  | p              | 9/ 5/28  | 24.1                | 36.1               | 8.21 | 5<br>4                            |
| 27      | 171         | 50        | r                  | n              | 9/ 7/28  | 26.0                | 36.2               | 8.30 | 4                                 |
| 30      | 188         | 0         | r                  | n              | 9/15/28  | 28.0                | 36.1               | 8.30 | 2                                 |
| 30      | 189         | 50        | r                  | n              | 9/15/28  | 27.8                | 36.1               | 8.29 | 3                                 |
| 30      | 190         | 100       | r                  | n              | 9/15/28  | 24.1                | 36.4               | 8.10 | 20                                |
| 31      | 191         | 0         | r                  | n              | 10/ 3/28 | 28.5                | 34.4               | 8.27 | 2                                 |
| 31      | 193         | 100       | r                  | n              | 10/ 3/28 | 23.4                | 36.5               | 8.19 | 28                                |

Table 34. Distributional and environmental records for Ceratium gibberum -- Continued

| Station        | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(o/oo) | pH           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|----------------|-------------|-----------|--------------------|----------------|----------------------|------------------|--------------------|--------------|--------------------------------------|
| 32             | 194         | 0         | oc                 | n              | 10/ 5/28             | 28.0             | 36.0               | 8.23         | 2                                    |
| 32             | 195         | 50        | r                  | n              | 10/ 5/28             | 27.2             | 36.0               | 8.24         | 2                                    |
| 32<br>33       | 196<br>197A | 100<br>0  | r<br>oc            | n              | 10/ 5/28<br>10/ 8/28 | 22.2<br>28.5     | 36.4<br>35.6       | 8.10         | 30<br>4                              |
| 34             | 200         | ő         | r                  | p<br>n         | 10/ 9/28             | 28.5             | 35.9               | 8.23<br>8.28 | 2                                    |
| 34             | 200A        | 0         | oc                 | p              | 10/ 9/28             | 28.5             | 35.9               | 8.28         | 2                                    |
| 34             | 202         | 50        | r                  | n              | 10/ 9/28             | 25.0             | 36.5               | 8.21         | 3                                    |
| 35-36          | 209         | 0         | oc                 | n              | 10/27/28             | (27.4            | 29.7               | 8.31         | 15)                                  |
| 35-36<br>37    | 212<br>217  | 0         | oc<br>r            | n<br>n         | 10/28/28<br>11/ 1/28 | (27.0<br>27.1    | 30.7<br>31.7       | 8.27<br>8.28 | 16)<br>15                            |
| 37             | 218         | 50        | r                  | n              | 11/ 1/28             | 18.8             | 34.5               | 8.00         | 121                                  |
| 37             | 219         | 100       | oc                 | n              | 11/ 1/28             | 15.1             | 34.9               | 7.82         | 153                                  |
| 37<br>42       | 221<br>242  | 50<br>50  | r                  | Þ              | 11/ 1/28             | 18.8             | 34.5               | 8.00         | 121                                  |
| 45             | 256         | 0         | r                  | n<br>n         | 11/13/28<br>11/19/28 | 17.2<br>22.4     | 34.9<br>35.3       | 7.99<br>8.12 | 68<br>38                             |
| 45             | 258         | 100       | r                  | n              | 11/19/28             | 18.6             | 35.1               | 8.00         | 50                                   |
| 45             | 259         | 0         | oc                 | p              | 11/19/28             | 22.4             | 35.3               | 8.12         | 38                                   |
| 45<br>46       | 260<br>261  | 50<br>0   | r                  | p              | 11/19/28             | 22.4             | 35.2<br>35.3       | 8.13         | 46<br>36                             |
| 46             | 262         | 50        | oc                 | n<br>n         | 11/21/28<br>11/21/28 | 23.3<br>23.2     | 35.3               | 8.16<br>8.16 | 40                                   |
| 46             | 263         | 100       | r                  | n              | 11/21/28             | 22.5             | 35.4               | 8.17         | 40                                   |
| 46             | 264         | 0         | r                  | p              | 11/21/28             | 23.3             | 35.3               | 8.16         | 36                                   |
| 46<br>47       | 265<br>266  | 50<br>0   | r<br>oc            | p<br>n         | 11/21/28<br>11/23/28 | 23.2<br>23.9     | 35.3<br>36.0       | 8.16<br>8.23 | 40<br>17                             |
| 47             | 267         | 50        | oc                 | n              | 11/23/28             | 23.8             | 36.0               | 8.23         | 20                                   |
| 47             | 268         | 100       | r                  | n              | 11/23/28             | 22.7             | 36.2               | 8.23         | 20                                   |
| 47             | 269<br>270  | 0<br>50   | r                  | p              | 11/23/28             | 23.9             | 36.0               | 8.23         | 17<br>20                             |
| 47<br>48       | 273         | 100       | r                  | p<br>n         | 11/23/28<br>11/25/28 | 23.8<br>22.7     | 36.0<br>36.3       | 8.23<br>8.26 | 16                                   |
| 48             | 274         | 0         | r                  | p              | 11/25/28             | 23.6             | 36.4               | 8.23         | 13                                   |
| 48             | 276         | 100       | г                  | p              | 11/25/28             | 22.7             | 36.3               | 8.26         | 16                                   |
| 49<br>49       | 277<br>279  | 0<br>100  | r                  | n              | 11/27/28<br>11/27/28 | 23.4<br>21.6     | 36.2<br>35.9       | 8.27<br>8.26 | 13<br>13                             |
| 49             | 282         | 100       | oc<br>r            | n<br>p         | 11/27/28             | 21.6             | 35.9               | 8.26         | 13                                   |
| 50             | 284         | 0         | oc                 | n              | 11/29/28             | 23.2             | 36.0               | 8.23         | 13                                   |
| 50             | 285         | 50        | oc                 | n              | 11/29/28             | 22.0             | 35.9               | 8.23         | 13                                   |
| 50<br>50       | 286<br>287  | 100       | oc<br>oc           | n              | 11/29/28<br>11/29/28 | 20.5<br>23.2     | 35.7<br>36.0       | 8.22<br>8.23 | 13<br>13                             |
| 50             | 289         | 100       | r                  | p<br>p         | 11/29/28             | 20.5             | 35.7               | 8.22         | 13                                   |
| 51             | 295         | 100       | r                  | n              | 12/ 1/28             | 20.0             | 35.6               | 8.22         | 17                                   |
| 51<br>52       | 298<br>300  | 100<br>50 | r                  | p              | 12/ 1/28<br>12/ 3/28 | 20.0<br>20.2     | 35.6<br>35.6       | 8.22<br>8.20 | 17<br>8                              |
| 52             | 301         | 100       | r                  | n<br>n         | 12/ 3/28             | 18.2             | 35.2               | 8.17         | 8                                    |
| 53             | 305         | 100       | r                  | n              | 12/ 5/28             | 19.9             | 35.6               | 8.19         | 13                                   |
| 53-54          | 307         | 0         | r                  | n              | 12/ 5/28             | (23.0            | 35.6               | 8.22         | 11)                                  |
| 53-54<br>53-54 | 308<br>312  | 0         | r                  | n<br>n         | 12/ 5/28<br>12/10/28 | (23.0<br>(23.0   | 35.6<br>35.6       | 8.22<br>8.22 | 11)<br>11)                           |
| 53-54          | 316         | ŏ         | r                  | n              | 12/12/28             | (23.0            | 35.6               | 8.22         | 11)                                  |
| 54             | 320         | 50        | ос                 | n              | 12/14/28             | 19.8             | 35.4               | 8.18         | 17                                   |
| 54<br>54       | 321<br>322  | 100       | oc                 | n              | 12/14/28<br>12/14/28 | 18.7<br>23.4     | 35.4<br>35.5       | 8.16<br>8.22 | 20<br>9                              |
| 55             | 324         | 50        | r<br>oc            | p<br>n         | 12/16/28             | 18.7             | 35.0               | 8.18         | 12                                   |
| 55             | 325         | 100       | r                  | n              | 12/16/28             | 16.7             | 34.9               | 7.17         | 12                                   |
| 56             | 328         | 0         | oc                 | n              | 12/18/28             | 20.8             | 34.9               | 8.13         | 9                                    |
| 56<br>56       | 329<br>330  | 50<br>100 | r<br>oc            | n<br>n         | 12/18/28<br>12/18/28 | 18.5<br>16.6     | 35.1<br>34.8       | 8.14<br>8.11 | 12                                   |
| 56             | 331         | 0         | oc                 | p              | 12/18/28             | 20.8             | 34.9               | 8,13         | 9                                    |
| 56-57          | 334         | 0         | oc                 | n              | 12/19/28             | (19.0            | 34.5               | 8.14         | 20)                                  |
| 57<br>57       | 335<br>336  | 0<br>50   | oc<br>r            | n<br>n         | 12/20/28<br>12/20/28 | 19.0<br>15.6     | 34.5<br>34.3       | 8.14<br>8.14 | 20<br>21                             |
| 57             | 337         | 100       | oc                 | n              | 12/20/28             | 14.3             | 34.4               | 8.10         | 40                                   |
| 57             | 338         | 0         | r                  | p              | 12/20/28             | 19.0             | 34.5               | 8.14         | 20                                   |
| 57             | 340         | 100       | oc                 | p              | 12/20/28             | 14.3             | 34.4               | 8.10         | 40<br>20                             |
| 58<br>63       | 344<br>379  | 0         | r                  | p<br>n         | 12/22/28 1/ 1/29     | 17.0<br>20.5     | 34.0<br>34.6       | 8.12<br>8.07 | 21                                   |
| 63             | 381         | 100       | r                  | n              | 1/ 1/29              | 15.6             | 34.6               | 8.08         | 24                                   |
| 63-64          | 386         | 0         | r                  | n              | 1/ 1/29              | (20.5            | 34.6               | 8.07         | 21)                                  |
| 63-64<br>63-64 | 387<br>388  | 0         | oc<br>r            | n<br>n         | 1/ 2/29<br>1/ 2/29   | (20.5<br>(20.5   | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)                           |
| 63-64          | 390         | ő         | r                  | n              | 1/ 2/29              | (20.5            | 34.6               | 8.07         | 21)                                  |
| 63-64          | 391         | 0         | r                  | n              | 1/ 3/29              | (20.5            | 34.6               | 8.07         | 21)                                  |
| 63-64          | 392         | 0         | r                  | n              | 1/ 3/29              | (20.5<br>(20.5   | 34.6               | 8.07         | 21)<br>21)                           |
| 63-64<br>64    | 393<br>394  | 0         | r<br>oc            | n<br>n         | 1/ 3/29<br>1/ 3/29   | 20.6             | 34.6<br>34.6       | 8.07<br>8.12 | 21                                   |
| 64             | 398         | 0         | r                  | p              | 1/ 3/29              | 20.6             | 34.6               | 8.12         | 21                                   |
| 64-65          | 401         | Ŏ         | oc                 | ñ              | 1/ 3/29              | (20.6            | 34.6               | 8.12         | 21)                                  |

Table 34. Distributional and environmental records for Ceratium gibberum--Continued

| Tab        | ole 34. Di        | stributio | nal and envir         | onmental       | records                       | for Ceratium gi     | bberumC            | Continu      | ed                                |
|------------|-------------------|-----------|-----------------------|----------------|-------------------------------|---------------------|--------------------|--------------|-----------------------------------|
| Station    | Sample            | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date                          | Temperature<br>(°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub> mg/m <sup>3</sup> |
| 64-65      | 402               | 0         | oc                    | n              | 1/ 4/29                       | (20.6               | 34.6               | 8.12         | 21)                               |
| 64-65      | 403               | Ő         | oc                    | 'n             | 1/ 4/29                       | (20.6               | 34.6               | 8.12         | 21)                               |
| 64-65      | 404               | 0         | oc                    | n              | 1/ 4/29                       | (20.6               | 34.6               | 8.12         | 21)                               |
| 65         | 405               | 0         | oc                    | n              | 1/ 5/29                       | 20.2                | 34.5               | 8.10         | 24                                |
| 6 <b>5</b> | 406               | 50        | r                     | n              | 1/ 5/29                       | 16.5                | 34.5               | 8.10         | 25                                |
| 65         | 407               | 100       | $\mathbf{r}$          | n              | 1/ 5/29                       | 14.8                | 34.3               | 8.10         | 34                                |
| 65         | 408               | 0         | oc                    | p              | 1/ 5/29                       | 20.2                | 34.5               | 8.10         | 24                                |
| 65         | 409               | 50        | r                     | p              | 1/ 5/29                       | 16.5                | 34.5               | 8.10         | 25                                |
| 66         | 413               | 0         | r                     | p              | 1/ 7/29                       | 19.4                | 34.7               | 8.10         | 29                                |
| 67         | 416               | 100       | oc                    | n              | 1/ 8/29                       | 19.3                | 34.9               | 8.11         | 21                                |
| 67<br>73   | 418               | 100       | oc                    | n              | 1/ 8/29<br>2/10/29            | 16.2                | 34.6               | 8.05         | 40                                |
| 73         | 450<br>451        | 50        | c<br>oc               | n<br>n         | 2/10/29                       | 25.3<br>18.7        | 35.4<br>35.4       | 8.21<br>8.05 | 44<br>122                         |
| 73         | 452               | 100       | oc                    | n              | 2/10/29                       | 14.7                | 35.0               | 7.80         | 178                               |
| 73         | 453               | 0         | oc                    | p              | 2/10/29                       | 25.3                | 35.4               | 8.21         | 44                                |
| 73         | 454               | 50        | r                     | p              | 2/10/29                       | 18.7                | 35.4               | 8.05         | 122                               |
| 73         | 455               | 100       | r                     | p              | 2/10/29                       | 14.7                | 35.0               | 7.80         | 178                               |
| 74         | 456               | 0         | oc                    | n              | 2/12/29                       | 24.2                | 35.6               | 8.17         | 68                                |
| 74         | 457               | 50        | r                     | n              | 2/12/29                       | 19.2                | 35.4               | 8.06         | 80                                |
| 74         | 458               | 100       | r                     | n              | 2/12/29                       | 15.4                | 35.1               | 7.80         | 175                               |
| 74         | 459               | 0         | r                     | p              | 2/12/29                       | 24.2                | 35.6               | 8.17         | 68                                |
| 74         | 461               | 100       | r                     | p              | 2/12/29                       | 15.4                | 35.1               | 7.80         | 175                               |
| 75         | 462               | 0         | oc                    | n              | 2/14/29                       | <b>22.</b> 8        | 35.8               | 8.18         | 44                                |
| 75         | 463               | 50        | r                     | n              | 2/14/29                       | 20.0                | 35.5               | 8.14         | 46                                |
| 75         | 464               | 100       | r                     | n              | 2/14/29                       | 17.8                | 35.4               | 8.00         | 75                                |
| 75         | 465               | 0         | r                     | p              | 2/14/29                       | 22.8                | <b>35.</b> 8       | 8.18         | 44                                |
| 76         | 467               | 0 .       | oc                    | n              | 2/16/29                       | 23.4                | 35.9               | 8.15         | 50                                |
| 76         | 468               | 50        | r                     | n              | 2/16/29                       | 22.1                | 35.9               | 8.14         | 42                                |
| 77<br>77   | 472               | 0         | oc                    | n              | 2/18/29                       | 23.7<br>23.7        | 36.0               | 8.19         | 16                                |
| 77         | 473               | 0         | r                     | p              | 2/18/29                       |                     | 36.0               | 8.19         | 16                                |
| 78         | 474<br>475        | 50<br>0   | oc                    | p              | 2/18/29                       | 23.5<br>24.6        | 36.0<br>36.0       | 8.19<br>8.17 | 16<br>32                          |
| 78         | 476               | 50        | 00                    | n<br>n         | 2/20/29<br>2/20/29            | 23.8                | 36.1               | 8.14         | 32                                |
| 78         | 477               | 100       | oc<br>oc              | n              | 2/20/29                       | 21.9                | 36.2               | 8.14         | 34                                |
| 78         | 478               | 0         | oc                    | p              | 2/20/29                       | 24.6                | 36.0               | 8.17         | 32                                |
| 78         | 479               | 50        | oc                    | p              | 2/20/29                       | 23.8                | 36.1               | 8.14         | 32                                |
| 79         | 481               | 0         | oc                    | 'n             | 2/22/29                       | 25.2                | 36.0               | 8.17         | 34                                |
| 79         | 482               | 50        | oc                    | n              | 2/22/29                       | 24.5                | 36.1               | 8.17         | 34                                |
| 79         | 483               | 100       | ос                    | n              | 2/22/29                       | 21.8                | 36.2               | 8.13         | 45                                |
| 79         | 484               | 0         | oc                    | p              | 2/22/29                       | 25.2                | 36.0               | 8.17         | 34                                |
| 79         | 485               | 50        | ос                    | p              | 2/22/29                       | 24.5                | 36.1               | 8.17         | 34                                |
| 80         | 486               | 0         | oc                    | n              | 2/24/29                       | 26.0                | 35.9               | 8.20         | 36                                |
| 80         | 487               | 50        | r                     | n              | 2/24/29                       | 25.9                | 36.0               | 8.19         | 29                                |
| 80         | 488               | 0         | oc                    | р              | 2/24/29                       | 26.0                | 35.9               | 8.20         | 36                                |
| 80         | 489               | 50        | r                     | p              | 2/24/29                       | 25.9                | 36.0               | 8.19         | 29                                |
| 80         | 490               | 100       | r                     | p              | 2/24/29                       | 23.4                | 36.2               | 8.16         | 32                                |
| 81         | 491               | 0         | С                     | n              | 2/26/29                       | 26.5                | 35.8               | 8.19         | 38                                |
| 81         | 492               | 50        | r                     | n              | 2/26/29                       | 26.4                | 35.9               | 8.19         | 38                                |
| 81         | 493               | 0         | r                     | p              | 2/26/29                       | 26.5                | 35.8               | 8.19         | 38                                |
| 82<br>83   | 497               | 50<br>0   | r                     | n              | 2/28/29                       | 27.2                | 36.3               | 8.21         | 34<br>29                          |
| 83         | 501<br>502        | 50        | r                     | n              | 3/ 2/29<br>3/ 2/29            | 27.5<br>27.4        | 36.3<br>36.5       | 8.24<br>8.24 | 29<br>25                          |
| 85         | 510               | 0         | oc<br>oc              | n<br>n         | 3/ 6/29                       | 27.9                | 36.2               | 8.22         | 40                                |
| 85         | 511               | 50        | r                     | n              | 3/ 6/29                       | 27.8                | 36.2               | 8.22         | 40                                |
| 86         | 516               | 0         | oc                    | n              | 3/ 9/29                       | 28.3                | 36.2               | 8.29         | 20                                |
| 87         | 521               | ő         | r                     | n              | 3/11/29                       | 27.8                | 36.1               | 8.28         | 17                                |
| 88         | 527               | 50        | oc                    | n              | 3/21/29                       | 28.4                | 35.9               | 8.25         | 13                                |
| 89         | 528               | 0         | oc                    | n              | 3/23/29                       | 28.4                | 35.6               | 8.25         | 21                                |
| 89         | 529               | 50        | oc                    | n              | 3/23/29                       | 28.6                | 35.8               | 8.27         | 12                                |
| 90         | 533               | 0         | c                     | n              | 3/25/29                       | 28.5                | 35.5               | 8.27         | 21                                |
| 90         | 534               | 50        | ос                    | n              | 3/25/29                       | 28.6                | 35.6               | 8.26         | 21                                |
| 90         | 535               | 0         | oc                    | p              | 3/25/29                       | 28.5                | 35.5               | 8.27         | 21                                |
| 90         | 536               | 50        | r                     | p              | 3/25/29                       | 28.6                | 35.6               | 8.26         | 21                                |
| 91         | 540               | 0         | ос                    | n,             |                               | 28.7                | 35.1               | 8.30         | 21                                |
| 91         | 541               | 50        | c ·                   | n              | 3/27/29                       | 28.5                | 35.2               | 8.30         | 24                                |
| 91         | 542               | 0         | r                     | p              | 3/27/29                       | 28.7                | 35.1               | 8.30         | 21                                |
| 91         | 543               | 50        | r                     | p              | 3/27/29                       | 28.5                | 35.2               | 8.30         | 24                                |
| 91         | 544               | 100       | r                     | p              | 3/27/29                       | 25.8                | 36.0               | 8.25         | 30                                |
| 92         | 546               | 50        | oc                    |                | 3/29/29                       | 28.4                | 35.4               | 8.29         | 28                                |
| 93         | 550               | 0         | oc                    | n              | 3/31/29                       | 28.7                | 34.7<br>34.8       | 8.30<br>8.30 | 28<br>28                          |
| 93<br>95   | 551<br>567        | 50<br>100 | oc                    | n              | 3/31/29                       | 28.5<br>28.5        | 35.6               | 8.21         | 25                                |
|            | 567               |           | r                     | p              | 4/24/29                       | 29.3                | 35.3               | 8.23         | 12                                |
|            | 560               | 5.5       |                       |                |                               |                     |                    |              |                                   |
| 96         | 568<br>569        | 50        | 00                    | n              | 4/26/29                       | 29.2                |                    |              |                                   |
|            | 568<br>569<br>570 | 50<br>100 | oc<br>oc              | n<br>n<br>n    | 4/26/29<br>4/26/29<br>5/26/29 | 29.2<br>28.2        | 35.3<br>35.7       | 8,23<br>8.19 | 12<br>25                          |

Table 34. Distributional and environmental records for Ceratium gibberum -- Continued

|            |                            | 1         |                    |        |                      |              | ,            |              |                            |
|------------|----------------------------|-----------|--------------------|--------|----------------------|--------------|--------------|--------------|----------------------------|
| Station    | Sample                     | Depth (m) | Relative abundance | Appa-  | Date                 | Temperature  | Salinity     | pH           | PO4                        |
|            |                            | (III)     | abulidance         | ratus  |                      | (°C)         | (0/00)       |              | mg/m <sup>3</sup>          |
| 99         | 589                        | 0 .       | С                  | n      | 5/ 2/29              | 27.9         | 34.9         | 8.21         | 12                         |
| 99         | 591                        | 100       | С                  | n      | 5/ 2/29              | 27.8         | 35.0         | 8.22         | 17                         |
| 99         | 592                        | 0         | oc                 | p      | 5/ 2/29              | 27.9         | 34.9         | 8.21         | 12                         |
| 99<br>99   | 594<br>595                 | 100       | oc                 | p      | 5/ 2/29              | 27.8         | 35.0         | 8.22         | 10                         |
| 100        | 596                        | 50        | c<br>c             | n<br>n | 5/ 2/29<br>5/ 4/29   | 27.9<br>27.6 | 34.9<br>34.7 | 8.21<br>8.21 | 12<br>10                   |
| 100        | 597                        | 100       | oc                 | n      | 5/ 4/29              | 27.6         | 34.7         | 8.22         | 12                         |
| 100        | 598                        | 0         | oc                 | p      | 5/ 4/29              | 27.7         | 34.7         | 8.21         | 10                         |
| 100        | 602                        | 100       | r                  | p      | 5/ 4/29              | 27.6         | 34.7         | 8.22         | 12                         |
| 101<br>101 | 603<br>604                 | 0<br>50   | oc                 | n      | 5/ 7/29              | 26.3         | 34.7         | 8.24         | 8                          |
| 101        | 605                        | 100       | c<br>r             | n<br>n | 5/ 7/29<br>5/ 7/29   | 26.2<br>25.2 | 34.7<br>35.1 | 8.24<br>8.23 | 8                          |
| 101        | 606                        | 0         | r                  | p      | 5/ 7/29              | 26.3         | 34.7         | 8.24         | 8                          |
| 102        | 609                        | 0         | OC                 | n      | 5/ 9/29              | 25.8         | 35.0         | 8.24         | 8                          |
| 102        | 611                        | 100       | r                  | n      | 5/ 9/29              | 25.6         | 35.0         | 8.23         | 8<br>8<br>5<br>7           |
| 103<br>104 | 617<br>621                 | 100       | r                  | n      | 5/11/29              | 24.8         | 35.2         | 8.25         | 5                          |
| 105        | 627                        | 50        | r                  | n<br>n | 5/13/29<br>5/15/29   | 26.1<br>26.8 | 35.2<br>34.9 | 8.24<br>8.23 | 5                          |
| 105        | 628                        | 50        | r                  | n      | 5/15/29              | 26.8         | 34.9         | 8.23         | 5<br>5<br>5<br>5           |
| 106        | 635                        | 100       | r                  | n      | 5/17/29              | 25.6         | 35.1         | 8.23         | 5                          |
| 107        | 639                        | 0         | oc                 | n      | 5/19/29              | 28.0         | 34.4         | 8.23         | 5                          |
| 107<br>107 | 640<br>645                 | 50<br>50  | r                  | n      | 5/19/29              | 27.9         | 34.4         | 8.23         | 4                          |
| 108        | 646                        | 0         | r                  | p<br>n | 5/19/29<br>5/27/29   | 27.9<br>28.4 | 34.4<br>35.0 | 8.23<br>8.25 | 4                          |
| 108        | 648                        | 100       | oc                 | n      | 5/27/29              | 25.2         | 35.0         | 8.23         | 4<br>3<br>5<br>5<br>5<br>5 |
| 109        | 655                        | 50        | r                  | n      | 5/29/29              | 23.1         | 35.0         | 8.22         | ŝ                          |
| 109        | 656                        | 100       | r                  | n      | 5/29/29              | 19.4         | 34.8         | 8.18         | 5                          |
| 110<br>111 | 661<br>668                 | 0         | r                  | n      | 5/31/29              | 23.9         | 34.7         | 8.18         | 5                          |
| 111        | 671                        | 0         | r                  | n<br>p | 6/ 3/29<br>6/ 3/29   | 20.1<br>20.1 | 34.5<br>34.5 | 8.18<br>8.18 | 5                          |
| 112        | 674                        | ŏ         | oc                 | n      | 6/ 5/29              | 23.2         | 34.6         | 8.22         | 7                          |
| 112        | 675                        | 50        | oc                 | n      | 6/ 5/29              | 21.7         | 34.6         | 8.23         | 7                          |
| 112        | 676                        | 100       | r                  | n      | 6/ 5/29              | 19.8         | 34.7         | 8.20         | 8                          |
| 113<br>113 | 680<br>681                 | 0<br>50   | oc                 | n      | 6/25/29              | 24.2         | 34.5         | 8.25         | 5<br>5                     |
| 113        | 682                        | 100       | oc<br>oc           | n<br>n | 6/25/29<br>6/25/29   | 23.8<br>21.5 | 34.6<br>34.7 | 8.25<br>8.23 | 8                          |
| 113        | 684                        | 50        | oc                 | p      | 6/25/29              | 23.8         | 34.6         | 8.25         | 5                          |
| 114        | 687                        | 50        | oc                 | n      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63                         |
| 114        | 687                        | 50        | r                  | n      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63                         |
| 130<br>133 | 784<br>805                 | 0         | r                  | p      | 9/ 4/29              | 16.2         | 33.4         | 8.34         | 36                         |
| 133        | 806                        | 50<br>100 | r                  | n<br>n | 9/10/29<br>9/10/29   | 20.8<br>18.4 | 34.7<br>34.8 | 8.37<br>8.31 | 7                          |
| 133        | 812                        | 0         | r                  | n      | 9/10/29              | 22.7         | 34.7         | 8.47         | 7                          |
| 134        | 808                        | 0         | r                  | n      | 9/12/29              | 22.9         | 34.7         | 8.34         | 6                          |
| 134        | 810                        | 100       | r                  | n      | 9/12/29              | 18.1         | 34.6         | 8.34         | 6                          |
| 134<br>134 | 81 <b>5</b><br>81 <b>7</b> | 0<br>100  | r                  | p      | 9/12/29<br>9/12/29   | 22.9<br>18.1 | 34.7         | 8.34         | 6                          |
| 135        | 821                        | 50        | r                  | p<br>n | 9/14/29              | 21.5         | 34.6<br>35.0 | 8.34<br>8.37 | 6<br>5<br>3<br>3<br>4      |
| 136        | 827                        | 0         | r                  | n      | 9/16/29              | 24.6         | 35.4         | 8.37         | 3                          |
| 136        | 832                        | 0         | r                  | p      | 9/16/29              | 24.6         | 35.4         | 8,37         | 3                          |
| 136        | 833                        | 50        | r                  | p      | 9/16/29              | 21.4         | 35.1         | 8.39         | 3                          |
| 137<br>138 | 8 <b>36</b><br>8 <b>44</b> | 0<br>50   | r                  | n      | 9/18/29<br>9/20/29   | 25.5<br>25.6 | 35.0<br>34.7 | 8.39<br>8.30 | 3                          |
| 139        | 849                        | 0         | r                  | n<br>n | 9/22/29              | 26.7         | 34.7         | 8.34         | 6                          |
| 140        | 856                        | 0         | r                  | n      | 10/ 3/29             | 26.9         | 35.0         | 8.42         | 7                          |
| 141        | 864                        | 0         | r                  | n      | 10/ 5/29             | 25.9         | 35.2         | 8.34         | 5                          |
| 141<br>141 | 865<br>868                 | 50<br>0   | r                  | n      | 10/ 5/29             | 24.8         | 35.3         | 8.34         | 5 5 5 5 6 6 6 6 6 6 7      |
| 141        | 869                        | 50        | r                  | p<br>p | 10/ 5/29<br>10/ 5/29 | 25.9<br>24.8 | 35.2<br>35.3 | 8.34<br>8.34 | 5                          |
| 142        | 872                        | 0         | r                  | n      | 10/ 7/29             | 24.1         | 34.8         | 8.33         | 5                          |
| 144        | 886                        | 0         | r                  | n      | 10/11/29             | 23.3         | 35.0         | 8.37         | 6                          |
| 145        | 890                        | 0         | r                  | n      | 10/13/29             | 22.3         | 34.6         | 8.29         | 6                          |
| 145<br>145 | 891<br>892                 | 50        | r                  | n      | 10/13/29             | 18.7         | 34.3         | 8.34         | 6                          |
| 145        | 896                        | 100       | r                  | n<br>n | 10/13/29<br>10/15/29 | 16.0<br>22.4 | 34.1<br>34.9 | 8.31<br>8.37 | 6                          |
| 146        | 898                        | 100       | oc                 | n      | 10/15/29             | 19.7         | 34.3         | 8.26         | 7                          |
| 147        | 905                        | 100       | r                  | n      | 10/17/29             | 19.2         | 35.0         | 8.29         | 5                          |
| 148        | 910                        | 0         | r                  | n      | 10/19/29             | 23.4         | 35.2         |              | 6                          |
| 149<br>150 | 920<br>929                 | 0         | r                  |        | 10/21/29<br>10/23/29 | 23.5<br>25.6 | 35.0         | 8.34         | 6                          |
| 150        | 930                        | 50        | r                  |        | 10/23/29             | 23.6<br>22.8 | 34.7<br>34.8 | 8.39<br>8.35 | 7<br>10                    |
| 150        | 931                        | 100       | oc                 |        | 10/23/29             | 19.6         | 34.6         | 8.32         | 11                         |
| 151        | 937                        | 0         | oc                 | n      | 10/26/29             | 26.0         | 34.0         |              |                            |
| 151        | 938                        | 50        | oc                 |        | 10/26/29             | 18.3         | 34.4         |              | • • •                      |
| 151        | 939                        | 100       | r                  |        | 10/26/29             | 12.5         | 34.6         |              | * * *                      |
| 151        | 941                        | 0         | r                  | р      | 10/26/29             | 26.0         | 34.0         |              | ***                        |

Table 34. Distributional and environmental records for Ceratium gibberum -- Concluded

| Station | Sample | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date     | Temperature (°C) | Salinity<br>(o/oo) | pH   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|-----------------------|----------------|----------|------------------|--------------------|------|--------------------------------------|
|         | I      | (111)     | abandance             | 1 444          | l        | ( 0 /            | (0,00)             |      |                                      |
| 151     | 0.40   | EO        | _                     |                | 10/00/00 | 10.9             | 24.4               |      |                                      |
| 151     | 942    | 50        | r                     | p              | 10/26/29 | 18.3             | 34.4               | 0.00 | ***                                  |
| 153     | 952    | 50        | r                     | n              | 10/29/29 | 28.1             | 34.4               | 8.39 | 7                                    |
| 153     | 953    | 100       | r                     | n              | 10/29/29 | 20.5             | 34.7               | 8.28 | 31                                   |
| 153     | 956    | 50        | r                     | p              | 10/29/29 | 28.1             | 34.4               | 8.39 | 7                                    |
| 154     | 958    | 0         | r                     | n              | 10/31/29 | 28.3             | 34.2               | 8.39 | 7                                    |
| 154     | 959    | 50        | r                     | n              | 10/31/29 | 28.2             | 34.2               | 8.40 | 7                                    |
| 154     | 960    | 100       | r                     | n              | 10/31/29 | 25.3             | 34.8               | 7.95 | 21                                   |
| 155     | 961    | 0         | r                     | n              | 11/ 2/29 | 27.8             | 34.9               | 8.29 | 29                                   |
| 155     | 965    | 0         | r                     | n              | 11/ 2/29 | 27.8             | 34.9               | 8.29 | 29                                   |
| 155     | 967    | 100       | ос                    | n              | 11/ 2/29 | 27.2             | 35.0               | 8.30 | 35                                   |
| 156     | 972    | 0         | oc                    | n              | 11/ 4/29 | 27.6             | 35.0               | 8.34 | 28                                   |
| 157     | 978    | 0         | oc                    | n              | 11/ 6/29 | 27.1             | 35.3               | 8.27 | 47.                                  |
| 157     | 979    | 50        | r                     | n              | 11/ 6/29 | 27.1             | 35.2               | 8.32 | 60                                   |
| 157     | 980    | 100       | oc                    | n              | 11/ 6/29 | 26.8             | 35.3               | 8.30 | 64                                   |
| 158     | 983    | 0         | c                     | n              | 11/ 8/29 | 28.2             | 35.6               | 8.34 | 36                                   |
| 158     | 984    | 50        | c                     | n              | 11/ 8/29 | 28.2             | 35.6               | 8.39 | 50                                   |
| 158     | 985    | 100       | c                     | n              | 11/ 8/29 | 27.6             | 35.9               | 8.39 | 48                                   |
| 159     | 990    | 0         | oc                    | n              | 11/11/29 | 28.6             | 35.7               | 8.37 | 15                                   |
| 159     | 991    | 50        | r                     | n              | 11/11/29 | 28.5             | 35.7               | 8.39 | 15                                   |
| 159     | 992    | 100       | r                     | n              | 11/11/29 | 28.0             | 35.7               | 8.37 | 23                                   |
| 160     | 1000   | 0         |                       |                | 11/13/29 | 28.6             | 35.6               | 8.37 | 12                                   |
|         |        | 100       | r                     | n              |          | 28.5             | 35.7               |      | 16                                   |
| 160     | 1003   | 100       | r                     | n              | 11/13/29 | 40.0             | 33.7               | 8.44 | 10                                   |

Table 35. Distributional and environmental records for Ceratium concilians

| Station          | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------------|------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 16               | 103        | 0         | r                  | р              | 8/13/28              | 25.9                | 36.2               | 8.24         | 8                                    |
| 16               | 104        | 50        | r                  | p              | 8/13/28              | 24.4                | 36.4               | 8.23         | 8                                    |
| 16               | 107        | 50        | r                  | n              | 8/13/28              | 24.4<br>20.4        | 36.4<br>34.9       | 8.23         | 8<br>34                              |
| 44<br>44         | 251<br>253 | 50<br>0   | r                  | n<br>p         | 11/17/28<br>11/17/28 | 20.4                | 34.9               | 8.03         | 38                                   |
| 45               | 257        | 50        | oc                 | n              | 11/19/28             | 22.4                | 35.2               | 8.13         | 46                                   |
| 61               | 366        | 0         | r                  | p              | 12/28/28             | 16.9                | 34.0               | 8.05         | 46                                   |
| 61-62            | 369        | Ö         | oc                 | n              | 12/28/28             | (16.9               | 34.0               | 8.05         | 46)                                  |
| 61-62            | 370        | 0         | С                  | n              | 12/29/28             | (16.9               | 34.0               | 8.05         | 46)                                  |
| 62               | 371        | 0         | c                  | n              | 12/30/28             | 19.2                | 34.2               | 8.12         | 32                                   |
| 62               | 372        | 50        | r                  | n              | 12/30/28             | 16.2                | 34.3               | 8.10         | 28                                   |
| 62               | 373        | 100       | r                  | n              | 12/30/28             | 13.1                | 34.2               | 8.06         | 48<br>32                             |
| 62<br>62         | 374<br>375 | 0<br>50   | oc                 | p              | 12/30/28<br>12/30/28 | 19.2<br>16.2        | 34.2<br>34.3       | 8.12<br>8.10 | 28                                   |
| 62-63            | 377        | 0         | r<br>oc            | p<br>n         | 12/31/28             | (20.5               | 34.6               | 8.07         | 21)                                  |
| 62-63            | 378        | ŏ         | r                  | n              | 12/31/28             | (20.5               | 34.6               | 8.07         | 21)                                  |
| 69               | 425        | 50        | r                  | n              | 1/12/29              | 17.4                | 35.1               | 7.99         | 151                                  |
| 69               | 426        | 100       | r                  | n              | 1/12/29              | 14.6                | 34.8               | 7.86         | 198                                  |
| 69               | 427        | 0         | oc                 | р              | 1/12/29              | 21.1                | 35.2               | 8.12         | 62                                   |
| 70               | 435        | 50        | r                  | p              | 1/13/29              | 15.4                | 35.0               | 7.88         | 178                                  |
| 71               | 438        | 0         | Г                  | n              | 2/ 6/29              | 23.5                | 35.2               | 8.13         | 58                                   |
| 71               | 440        | 100       | r                  | n              | 2/ 6/29 2/ 6/29      | 13.9<br>23.5        | 35.0<br>35.2       | 7.71<br>8.13 | 220<br>58                            |
| 71<br>72         | 441<br>444 | 0<br>50   | oc                 | p<br>n         | 2/ 6/29<br>2/ 8/29   | 18.7                | 35.4               | 8.12         | 60                                   |
| 72               | 445        | 100       | r                  | n              | 2/ 8/29              | 14.8                | 35.0               | 7.94         | 154                                  |
| 72               | 446        | 0         | r                  | p              | 2/ 8/29              | 24.9                | 35.3               | 8.16         | 50                                   |
| 72               | 447        | 50        | r                  | p              | 2/ 8/29              | 18.7                | 35.4               | 8.12         | 60                                   |
| 87               | 524        | 50        | r                  | p              | 3/11/29              | 26.5                | 36.1               | 8.26         | 20                                   |
| 88               | 526        | 0         | ОС                 | n              | 3/21/29              | 28.5                | 35.9               | 8.23         | 16                                   |
| 93               | 552        | 0         | r                  | p              | 3/31/29              | 28.7                | 34.7               | 8.30         | 28                                   |
| 95               | 563<br>566 | 50<br>50  | r                  | n              | 4/24/29              | 29.3<br>29.3        | 34.9<br>34.9       | 8.24         | 16<br>16                             |
| 9 <b>5</b><br>96 | 569        | 50        | oc                 | p<br>n         | 4/24/29<br>4/26/29   | 29.2                | 35.3               | 8.23         | 12                                   |
| 96               | 571        | 0         | r                  | p              | 4/26/29              | 29.3                | 35.3               | 8.23         | 12                                   |
| 96               | 572        | 50        | oc                 | p              | 4/26/29              | 29.2                | 35.3               | 8.23         |                                      |
| 102              | 609        | 0         | oc                 | 'n             | 5/ 9/29              | 25.8                | 35.0               | 8.24         | 12<br>8<br>8<br>5<br>5<br>7<br>5     |
| 102              | 612        | 0         | r                  | p              | 5/ 9/29              | 25.8                | 35.0               | 8.24         | 8                                    |
| 103              | 615        | 0         | r                  | n              | 5/11/29              | 26.0                | 35.0               | 8.25         | 5                                    |
| 103              | 618        | 0         | r                  | p              | 5/11/29              | 26.0                | 35.0               | 8.25         | 5                                    |
| 104              | 626        | 100       | r                  | p              | 5/13/29              | 25.3<br>26.9        | 35.3<br>34.9       | 8.21<br>8.23 | 5                                    |
| 105              | 630        | 0         | r                  | p              | 5/15/29<br>5/27/29   | 26.8                | 35.0               | 8.24         | 4                                    |
| 108<br>108       | 647<br>648 | 50<br>100 | OC                 | n<br>n         | 5/27/29              | 25.2                | 35.0               | 8.23         | 4                                    |
| 109              | 656        | 100       | r                  | n              | 5/29/29              | 19.4                | 34.8               | 8.18         | 5                                    |
| 109              | 659        | 100       | r                  | p              | 5/29/29              | 19.4                | 34.8               | 8.18         | 5                                    |

Table 35. Distributional and environmental records for Ceratium concilians -- Concluded

| Station    | Sample     | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|------------|-----------|-----------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 110        | 661        | 0         | r                     | n              | 5/31/29              | 23.9                | 34.7               | 8.18         | E                                    |
| 110        | 663        | 100       | r                     | n              | 5/31/29              | 17.9                | 34.7               | 8.14         | 5<br>11                              |
| 110        | 664        | 0         | oc                    | p              | 5/31/29              | 23.9                | 34.7               | 8.18         | 5                                    |
| 110        | 665        | 50        | r                     | p              | 5/31/29              | 18.4                | 34.8               | 8.16         | 7                                    |
| 112        | 674        | 0         | r                     | n              | 6/ 5/29              | 23.2                | 34.6               | 8.22         | 7                                    |
| 112        | 676        | 100       | r                     | n              | 6/ 5/29              | 19.8                | 34.7               | 8.20         | 7 8                                  |
| 128        | 779        | 0         | r                     | n              | 7/25/29              | 16.4                | 33.0               | 8.12         | 29                                   |
| 129        | 780        | 0         | r                     | n              | 9/27/29              | 16.3                | 33.1               | 8.13         | 25                                   |
| 130        | 781        | . 0       | r                     | n              | 9/ 4/29              | 16.2                | 33.4               | 8.34         | 36                                   |
| 130        | 782        | 50        | r                     | n              | 9/ 4/29              | 11.7                | 33.4               | 8.26         | 83                                   |
| 130        | 784        | 0         | r                     | р              | 9/ 4/29              | 16.2                | 33.4               | 8.34         | 36                                   |
| 131        | 789        | 100       | oc                    | n              | 9/ 6/29              | 12.1                | 33.4               | 8.32         |                                      |
| 136        | 834        | 100       | $\mathbf{r}$          | р              | 9/16/29              | 18.6                | 35.0               | 8.39         | 3                                    |
| 138        | 845        | 100       | r                     | . n            | 9/20/29              | 22.2                | 34.8               | 8.31         | 3                                    |
| 140        | 858        | 100       | r                     | n              | 10/ 3/29             | 25.5                | 35.0               | 8.34         | 7                                    |
| 140        | 862        | 100       | r                     | p              | 10/ 3/29             | 25.5                | 35.0               | 8.34         | 7                                    |
| 141        | 868        | 0         | r                     | p              | 10/ 5/29             | 25.9                | 35.2               | 8.34         | 5                                    |
| 142        | 874        | 100       | r                     | n              | 10/ 7/29             | 16.6                | 34.4               | 8.27         | 7                                    |
| 142        | 879        | 100       | r                     | р              | 10/ 7/29             | 16.6                | 34.4               | 8.27         | 7                                    |
| 146        | 897        | 50        | r                     | n              | 10/15/29             | 22.4                | 34.9               | 8.30         | 6                                    |
| 150        | 930        | 50        | r                     | n              | 10/23/29             | 22.8                | 34.8               | 8.35         | 10                                   |
| 150        | 931        | 100       | r                     | n              | 10/23/29             | 19.6                | 34.6               | 8.32         | 11                                   |
| 151<br>153 | 941<br>951 | 0         | r                     | p              | 10/26/29             | 26.0                | 34.0               | 0.45         | • • • •                              |
| 154        | 951        | 0         | r                     | n              | 10/29/29             | 28.1                | 34.2               | 8.47         | 7                                    |
| 154        | 959        | 50        | r                     | n              | 10/31/29             | 28.3<br>28.2        | 34.2<br>34.2       | 8.39<br>8.40 | 7<br>7                               |
| 155        | 965        | 0         | r                     | n              | 10/31/29<br>11/ 2/29 | 28.2<br>27.8        | 34.2<br>34.9       | 8.29         | 29                                   |
| 156        | 974        | 100       | r                     | n              | 11/ 4/29             | 26.4                | 35.1               | 8.30         | 48                                   |
| 157        | 978        | 0         | r                     | n<br>n         | 11/ 6/29             | 27.1                | 35.3               | 8.27         | 47                                   |
| 158        | 983        | ő         | oc                    | n              | 11/ 8/29             | 28.2                | 35.6               | 8.34         | 36                                   |
| 158        | 985        | 100       | r                     | n              | 11/ 8/29             | 27.6                | 35.9               | 8.39         | 48                                   |

Table 36. Distributional and environmental records for Ceratium lunula

| Station | Sample | Depth | Relative  | Appa- | Date     | Temperature    | Salinity     | nU.          | PO <sub>4</sub>   |
|---------|--------|-------|-----------|-------|----------|----------------|--------------|--------------|-------------------|
| Station | Sample | (m)   | abundance | ratus | Date     | (°C)           | (0/00)       | pН           | mg/m <sup>3</sup> |
|         |        | ()    | 1         |       |          | ( )            | (0,00)       |              | 25/25             |
| 1       | 4      | 0     | 0.0       |       | 5/12/28  | 24.0           | 36.2         | 8.16         | 34                |
| 1       | 1 2    | 70    | oc        | n     |          | (22.4          | 36.4         |              | 35)               |
|         | 5      | 0     | r         | n     | 5/12/28  | (22.3          | 36.3         | 8.17<br>8.20 |                   |
| 1a      | 9      | 0     | r         | n     | 5/14/29  |                |              |              | 46)               |
| 1b      | 6<br>7 | 50    | С         | n     | 5/16/28  | (22.3<br>(22.2 | 36.3         | 8.20<br>8.21 | 46)<br>39)        |
| 1b      | 8      |       | oc        | n     | 5/16/28  | (20.3          | 36.4<br>35.5 | 8.18         | 36)               |
| 1b      |        | 100   | oc        | n     | 5/16/28  |                |              |              |                   |
| 2       | 14     |       | r         | n     | 5/18/28  | 20.5           | 36.4         | 8.23         | 58                |
| 15      | 98     | 50    | r         | p     | 8/11/28  | 19.8           | 36.5         | 8.21         | 8                 |
| 15      | 100    | 0     | r         | n     | 8/11/28  | 24.8           | 36.4         | 8.21         | 11                |
| 15      | 101    | 50    | r         | n     | 8/11/28  | 19.8           | 36.5         | 8.21         | 8                 |
| 16      | 107    | 50    | r         | n     | 8/13/28  | 24.4           | 36.4<br>36.8 | 8.23<br>8.24 | 8<br>5<br>5<br>3  |
| 18      | 118    | 50    | r         | n     | 8/17/28  | 22.4           |              | 8.25         | 5                 |
| 19      | 124    | 100   | r         | n     | 8/20/28  | 22.4           | 37.0         |              | o<br>o            |
| 20      | 129    | 50    | r         | n     | 8/22/28  | 25.8           | 36.6         | 8.26         | 3                 |
| 25      | 161    | 50    | r         | n     | 9/ 3/28  | 21.5           | 36.0         | 8.22         | 12                |
| 31      | 193    | 100   | r         | n     | 10/ 3/28 | 23.4           | 36.5         | 8.19         | 28                |
| 34      | 201    | 100   | r         | n     | 10/ 9/28 | 20.5           | 36.6<br>36.5 | 8.16<br>8.21 | 16                |
| 34      | 202    | 50    | r<br>_    | n     | 10/ 9/28 | 25.0<br>27.4   | 29.7         | 8.31         | 3<br>15           |
| 35      | 203    | 0     | r         | n     | 10/26/28 |                |              |              |                   |
| 352     | 208    | 0     | oc        | n     | 10/26/28 | (27.4<br>(27.4 | 29.7<br>29.7 | 8.31<br>8.31 | 15)               |
| 35-36   | 209    | 0     | r         | n     | 10/27/28 | 16.3           | 34.6         | 7.92         | 15)               |
| 39      | 226    | 50    | oc        | n     | 11/ 6/28 |                | 35.0         |              | 48<br>159         |
| 40      | 231    | 100   | r         | n     | 11/ 8/28 | 13.9<br>20.4   | 34.2         | 7.85<br>8.11 | 32                |
| 41      | 235    | 0     | r         | n     | 11/10/28 | 14.6           | 35.0         | 7.94         | 58                |
| 41      | 236    | 50    | r         | n     | 11/10/28 | 18.7           | 34.7         | 8.06         | 45                |
| 42      | 241    | 0     | r         | n     | 11/13/28 |                |              | 8.17         |                   |
| 46      | 263    | 100   | r         | n     | 11/21/28 | 22.5<br>23.3   | 35.4<br>35.3 | 8.17         | 40<br>36          |
| 46      | 264    | 0     | r         | p     | 11/21/28 | 23.3           | 36.0         | 8.23         | 17                |
| 47      | 266    | 0     | r         | n     | 11/23/28 | 23.9           | 36.0         | 8.23         | 20                |
| 47      | 267    | 50    | Г         | n     | 11/23/28 | 23.8           | 36.2         | 8.23         |                   |
| 47      | 268    | 100   | r         | n     | 11/23/28 |                | 35.2         | 8.12         | 20<br>62          |
| 69      | 424    | 0     | oc        | n     | 1/12/29  | 21.1           | 35.2         | 7.99         | 151               |
| 69      | 425    | 50    | oc        | n     | 1/12/29  | 17.4<br>14.6   | 34.8         | 7.86         | 198               |
| 69      | 426    | 100   | oc        | n     | 1/12/29  | 21.1           | 35.2         | 8.12         | 62                |
| 69      | 427    | 0     | oc        | p     | 1/12/29  |                | 35.1         | 7.99         | 151               |
| 69      | 428    | 50    | oc        | p     | 1/12/29  | 17.4           | 20.1         | 1.55         | 101               |

Table 36. Distributional and environmental records for Ceratium lunula--Continued

|   |         | rable 36. | 215011040 | ionai and env | i oimen | ar records | s for Ceratium | IuliulaCo | nimued |                                   |
|---|---------|-----------|-----------|---------------|---------|------------|----------------|-----------|--------|-----------------------------------|
| 60  | Station | Sample    |           |               |         | Date       |                |           | рН     | PO <sub>4</sub> mg/m <sup>3</sup> |
| 70  | 60      | 420       | 100       |               |         | 1 /12 /20  | 14.6           | 24.0      | 7 00   |                                   |
| 70  |         |           |           |               |         | 1/12/29    |                |           |        |                                   |
| 70  | 70      |           |           |               |         |            |                |           | 7 88   |                                   |
| 711   |         |           |           |               |         | 1/13/29    |                | 35.0      |        | 178                               |
| 711   |         |           |           |               |         |            |                | 35.0      |        | 220                               |
| 72  | 71      |           |           |               |         | 2/ 6/29    |                |           |        |                                   |
| 72-73   | 72      |           |           | г             |         | 2/ 8/29    |                |           |        |                                   |
| 73  | 72      |           |           |               | n       |            |                |           |        | 60                                |
| 73  | 72-73   |           |           |               |         |            |                |           |        |                                   |
| 74  | 73      |           |           |               |         |            |                |           |        |                                   |
| 75  |         |           |           |               |         |            |                |           |        |                                   |
| 75  |         |           |           |               |         |            |                |           |        |                                   |
| 75  | 75      |           |           |               |         | 2/14/25    | 20.0           |           |        |                                   |
| 75  | 75      |           |           |               |         | 2/14/29    | 17.8           |           |        |                                   |
| 75  |         |           |           |               |         |            |                |           |        |                                   |
| 76  | 75      |           |           |               |         |            | 20.0           |           |        |                                   |
| 76  | 76      |           |           |               |         |            | 23.4           |           |        |                                   |
| 76  | 76      | 469       | 100       |               |         | 2/16/29    |                |           |        |                                   |
| 777   | 76      | 470       |           | r             |         | 2/16/29    |                | 35.9      |        |                                   |
| 79  |         |           |           |               |         |            |                | 36.0      | 8.19   |                                   |
| 80  |         |           |           |               | p       | 2/18/29    |                |           |        | 16                                |
| 80  |         |           |           |               |         |            |                | 36.2      |        |                                   |
| 81  |         |           |           |               |         |            |                |           |        |                                   |
| 81  |         |           |           |               |         | 2/24/29    |                |           |        | 29                                |
| 81  |         |           |           |               |         |            |                |           |        | 38                                |
| 82  |         |           |           |               |         | 2/26/29    |                | 35.8      |        |                                   |
| 82  |         |           |           |               |         | 2/28/29    |                |           |        |                                   |
| 82  | 82      |           |           |               |         |            |                |           |        |                                   |
| 82 500 100 r p 2/28/29 27.4 36.5 8.19 34 83 501 0 r n 3/2/29 27.5 36.3 8.24 29 85 510 0 r n 3/2/29 27.5 36.3 8.24 29 81 540 0 r n 3/27/29 28.7 35.1 8.30 21 91 541 50 r n 3/27/29 28.5 35.2 8.30 24 93 551 50 oc n 3/31/29 28.5 34.8 8.30 28 94 558 50 oc n 4/22/29 28.5 35.6 8.21 25 95 563 50 r n 4/22/29 28.5 35.6 8.21 25 95 563 50 r n 4/24/29 29.3 34.9 8.24 16 96 569 50 r n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 576 100 oc n 4/28/29 28.3 35.2 8.16 24 97 576 100 oc n 4/28/29 28.3 35.4 8.16 21 97 576 50 oc n 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/28/29 27.6 35.6 8.15 25 97 578 50 r n 4/28/29 27.6 35.6 8.15 25 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 5/2/29 27.8 34.9 8.21 12 99 590 50 r n 5/2/29 27.8 34.9 8.21 12 100 597 100 r n 5/2/29 27.8 34.9 8.21 12 100 597 500 c n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.8 34.9 8.21 12 100 604 100 r n 5/2/29 27.8 34.9 8.21 12 100 605 50 oc n 5/2/29 27.8 34.9 8.21 12 100 606 50 oc n 5/2/29 27.8 34.9 8.21 12 100 607 100 oc n 5/2/29 27.8 34.9 8.21 12 100 608 500 r n 5/2/29 27.8 34.9 8.21 12 100 608 500 r n 5/2/29 27.8 34.9 8.21 12 100 609 100 r n 5/2/29 27.8 35.0 8.22 17 100 604 507 100 r n 5/2/29 27.8 34.9 8.21 12 100 605 500 c n 5/15/29 25.8 35.0 8.22 17 100 606 634 50 r n 5/15/29 25.8 35.0 8.23 5 106 635 100 oc n 5/15/29 25.8 35.0 8.23 4 104 623 100 oc n 5/15/29 25.8 35.0 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.23 5 107 668 607 0 c n 5/29/29 27.9 34.9 8.21 10 108 647 50   | 82      |           |           |               |         |            |                |           | 8.21   |                                   |
| 85 501 0 r n 3/2/29 27.5 36.3 8.24 29 85 510 0 r n 3/6/29 27.9 36.2 8.22 40 91 540 0 r n 3/27/29 28.7 35.1 8.30 21 91 541 50 r n 3/27/29 28.5 35.2 8.30 24 93 551 50 oc n 4/22/29 28.5 35.2 8.30 28 94 558 50 oc n 4/22/29 29.3 34.7 8.25 14 94 559 100 r n 4/22/29 29.3 34.9 8.21 16 96 569 50 r n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.4 8.16 24 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 50 oc n 4/28/29 28.0 35.4 8.16 21 97 578 50 r p 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 27.0 35.3 8.16 21 99 590 50 r n 4/30/29 27.0 35.3 8.16 28 99 590 50 r n 5/2/29 27.8 34.9 8.21 12 99 590 50 r n 5/2/29 27.8 34.9 8.21 12 100 597 100 r n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 10 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 10 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 100 603 100 oc n 5/13/29 25.8 35.0 8.24 8 104 623 100 oc n 5/13/29 25.8 35.0 8.24 8 104 623 100 oc n 5/13/29 25.8 35.0 8.24 8 104 623 100 oc n 5/13/29 25.8 35.0 8.24 8 104 623 100 oc n 5/13/29 25.8 35.0 8.23 5 105 628 50 oc n 5/13/29 25.8 35.0 8.23 5 106 634 50 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 106 636 100 oc n 5/13/29 25.8 35.0 8.23 4 108 648 100 oc n 5/13/29 25.8 35.0 8.23 4 109 656 100 oc n 5/27/29 25.2 35.0 8.23 4 112 676 00 oc n 6/5/29 23.2 34.6 8.22 7 111 688 0 r n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.25 5  |         | 500       |           |               |         |            |                |           |        |                                   |
| 91 540 0 r n 3/27/29 28.7 35.1 8.30 21 93 551 50 oc n n 3/27/29 28.5 35.2 8.30 24 93 551 50 oc n n 3/31/29 28.5 35.2 8.30 24 94 558 50 oc n 4/22/29 29.3 34.7 8.25 14 94 559 100 r n 4/22/29 29.3 34.7 8.25 14 96 559 563 50 r n 4/24/29 29.3 34.9 8.24 16 96 569 50 r n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 28.2 35.7 8.19 25 96 572 50 r p 4/26/29 28.2 35.3 8.23 12 97 575 50 oc n 4/28/29 28.3 35.2 8.16 24 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 98 581 0 r p 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 27.0 35.3 8.16 24 99 590 0 oc n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 35.0 8.22 17 100 596 50 oc n 5/2/29 27.8 35.0 8.22 17 100 596 50 oc n 5/2/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 12 100 696 50 oc n 5/2/29 27.8 35.0 8.24 8.16 12 100 696 50 oc n 5/2/29 27.8 35.0 8.24 8.11 100 696 50 oc n 5/2/29 27.8 35.0 8.24 8.11 100 696 50 r n 5/4/29 27.6 34.7 8.21 12 100 696 50 oc n 5/15/29 26.8 34.9 8.21 12 100 696 50 r n 5/15/29 26.8 34.9 8.21 12 100 696 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.24 8 109 655 50 oc n 5/15/29 26.8 34.9 8.23 5 106 635 50 oc n 5/15/29 26.8 34.9 8.23 5 106 635 50 oc n 5/15/29 26.8 34.9 8.23 5 107 n 5/17/29 27.0 35.0 8.24 8 108 647 50 oc n 5/15/29 26.8 35.0 8.24 8 109 656 50 oc n 5/15/29 26.8 35.0 8.24 8 109 656 50 oc n 5/29/29 18.4 34.8 8.18 5 106 637 50 oc n 6/5/29 19.4 34.8 8.18 5 107 668 670 0 oc n 6/5/29 21.7 34.6 8.23 7 112 676 0 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 0 oc n 6/5/29 23.2 34.6 8.22 7 112 676 0 oc n 6/5/29 23.2 34.6 8.22 7 112 677 0 r p 6/5/29 23.2 34.6 8.25 5 |         |           |           | r             |         | 3/ 2/29    | 27.5           | 36.3      |        |                                   |
| 91 541 50   |         |           |           |               | n       |            | 27.9           |           |        | 40                                |
| 93 551 50 oc n 3/31/29 28.5 34.8 8.30 28 94 558 50 oc n 4/22/29 29.3 34.7 8.25 14 94 559 100 r n 4/22/29 29.3 34.7 8.25 12 95 563 50 r n 4/24/29 29.3 34.9 8.24 16 96 570 100 oc n 4/26/29 28.2 35.3 8.23 12 96 570 100 oc n 4/26/29 28.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.7 8.19 25 97 575 50 oc n 4/28/29 28.3 35.2 8.16 24 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 97 578 50 r p 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.6 35.6 8.15 25 99 589 0 oc n 5/2/29 27.9 34.9 8.21 12 99 580 50 r n 4/30/29 26.9 35.3 8.16 28 99 589 0 oc n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 34.9 8.22 12 100 596 50 oc n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/2/29 27.8 35.0 8.22 17 100 597 500 oc n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r n 5/4/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 105 627 50 oc n 5/15/29 25.8 35.0 8.24 8 106 635 50 oc n 5/15/29 25.8 35.0 8.24 8 107 668 0 r n 5/17/29 27.0 35.0 8.23 5 108 647 50 oc n 5/15/29 25.8 35.0 8.24 8 109 655 50 oc n 5/15/29 25.8 35.0 8.24 8 109 655 50 oc n 5/15/29 25.8 35.0 8.24 8 109 655 50 oc n 5/15/29 25.8 35.0 8.24 8 109 655 50 oc n 5/15/29 25.8 35.0 8.24 8 109 655 50 oc n 5/15/29 25.8 35.0 8.23 5 105 628 50 oc n 5/15/29 25.8 35.0 8.23 5 106 635 50 oc n 5/15/29 25.8 35.0 8.23 5 107 668 0 r n 6/5/29 21.7 34.6 8.22 7 108 647 50 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 677 0 r p 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 115 680 0 oc n 6/5/29 23.2 34.6 8.22 7 115 680 0 oc n 6/5/29 23.2 34.6 8.22 7  |         |           |           |               |         | 3/27/29    |                |           |        |                                   |
| 94 558 50 oc n 4/22/29 29.3 34.7 8.25 14 94 559 100 r n 4/22/29 29.3 34.9 8.21 15 95 563 50 r n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 29.2 35.3 8.23 12 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.6 35.6 8.15 25 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 27.0 35.3 8.16 24 99 589 0 oc n 5/2/29 27.8 34.9 8.21 12 99 590 50 r n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 597 100 r n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.6 34.7 8.21 10 100 597 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 r n 5/2/29 27.8 34.9 8.21 12 100 602 100 oc n 5/13/29 25.3 35.3 8.16 628 50 oc n 5/15/29 25.8 35.0 8.22 17 105 628 50 oc n 5/15/29 25.8 35.0 8.22 12 106 635 100 oc n 5/15/29 25.8 35.0 8.23 5 106 635 100 oc n 5/15/29 25.8 35.0 8.23 5 106 635 100 oc n 5/15/29 25.8 35.0 8.23 5 106 635 100 oc n 5/15/29 25.8 35.0 8.23 5 106 635 100 oc n 5/15/29 25.8 35.0 8.23 5 106 635 100 oc n 5/15/29 25.2 35.1 8.23 5 106 635 100 oc n 5/15/29 25.2 35.1 8.23 5 106 635 100 oc n 5/15/29 25.2 35.1 8.23 5 107 688 0 oc n 5/15/29 25.2 35.1 8.23 5 108 647 50 oc n 5/15/29 25.2 35.1 8.23 5 109 656 50 oc n 6/3/29 11.3 4.6 8.22 7 111 688 0 r n 6/3/29 20.1 34.5 8.18 5 110 662 75 0 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 677 0 r p 6/5/29 23.2 34.6 8.22 7 112 677 0 r p 6/5/29 23.2 34.6 8.22 7 112 677 0 r p 6/5/29 23.2 34.6 8.22 7     |         |           |           |               |         |            |                |           |        |                                   |
| 94 559 100 r n 4/22/29 28.5 35.6 8.21 25 95 563 50 r n 4/24/29 29.3 34.9 8.24 16 96 569 50 r n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 28.2 35.7 8.19 25 96 572 50 r p 4/26/29 28.2 35.7 8.19 25 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 98 581 0 r p 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.6 35.6 8.15 25 99 590 50 r n 4/30/29 27.0 35.3 8.16 24 99 590 0 oc n 5/2/29 27.8 35.3 8.16 28 99 590 0 oc n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 34.9 8.21 12 100 596 50 oc n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.21 12 102 610 50 r n 5/4/29 27.6 34.7 8.21 12 103 602 100 r n 5/4/29 27.6 34.7 8.21 12 104 623 100 oc n 5/4/29 27.6 34.7 8.22 12 105 628 50 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 106 634 50 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 oc n 5/27/29 25.8 35.0 8.24 4 108 648 100 oc n 5/27/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 106 635 100 r n 5/17/29 25.6 35.1 8.23 5 107 662 50 r n 6/3/29 20.1 34.5 8.25 5   |         |           |           |               |         |            |                |           |        |                                   |
| 95 563 50 r n 4/24/29 29.2 35.3 34.9 8.24 16 96 570 100 oc n 4/26/29 29.2 35.3 8.23 12 96 570 100 oc n 4/26/29 28.2 35.7 8.19 25 96 572 50 r p 4/26/29 29.2 35.3 8.23 12 97 574 0 oc n 4/28/29 28.3 35.2 8.16 24 97 575 50 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 97 576 100 oc n 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 26.9 35.3 8.16 24 99 589 0 oc n 5/2/29 27.8 34.9 8.21 12 99 590 50 r n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 100 596 50 oc n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 105 629 100 r n 5/15/29 26.8 34.9 8.23 5 106 635 100 r n 5/15/29 25.2 35.1 8.23 5 106 635 100 r n 5/17/29 25.0 35.0 8.23 5 106 635 100 r n 5/17/29 25.0 35.0 8.23 5 106 635 50 oc n 5/15/29 26.8 34.9 8.23 5 106 635 100 r n 5/17/29 25.0 35.0 8.23 5 106 635 100 r n 5/17/29 25.0 35.0 8.23 5 107 682 100 r n 5/17/29 25.0 35.0 8.23 5 108 647 50 oc n 5/27/29 25.2 35.0 8.23 5 109 655 50 oc n 5/29/29 18.4 34.8 8.16 7 111 668 0 r n 6/3/29 20.1 34.5 8.18 5 110 662 67 50 oc n 6/5/29 21.7 34.6 8.22 7 112 676 100 oc n 6/5/29 21.7 34.6 8.22 7 112 676 100 oc n 6/5/29 21.7 34.6 8.22 7 112 676 100 oc n 6/5/29 21.7 34.6 8.22 7 112 676 100 oc n 6/5/29 21.7 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 24.2 34.5 8.25 5   |         |           |           |               |         | 4/22/29    |                |           |        | 14                                |
| 96 569 50   |         |           |           |               |         | 1/24/25    | 20.0           |           |        | 16                                |
| 96 572 50   |         |           |           |               |         |            |                |           |        | 12                                |
| 96 572 50   |         |           |           |               |         |            |                |           |        | 25                                |
| 97 574 0 0 0c n 4/28/29 28.3 35.2 8.16 24 97 575 50 0c n 4/28/29 27.6 35.6 8.15 25 97 578 50 r p 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 4/30/29 27.0 35.3 8.16 28 99 589 0 0 0c n 5/2/29 27.9 34.9 8.21 12 99 590 50 r n 5/2/29 27.8 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 34.9 8.21 12 99 595 0 0c n 5/2/29 27.9 34.9 8.21 12 100 596 50 0c n 5/2/29 27.9 34.9 8.21 12 100 597 100 r n 5/2/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 102 610 50 r n 5/9/29 25.8 35.0 8.24 12 104 623 100 0c n 5/13/29 25.8 35.0 8.24 12 105 627 50 0c n 5/15/29 25.8 35.0 8.24 8 104 623 100 0c n 5/15/29 25.8 35.0 8.24 8 104 623 100 0c n 5/15/29 25.8 35.0 8.24 8 105 627 50 0c n 5/15/29 25.8 35.0 8.24 8 106 634 50 r n 5/15/29 25.6 34.7 8.23 5 105 628 50 0c n 5/15/29 25.6 35.1 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.23 5 108 647 50 0c n 5/17/29 27.0 35.0 8.23 5 108 647 50 0c n 5/17/29 27.0 35.0 8.23 5 108 648 100 0c n 5/27/29 25.2 35.1 8.23 5 108 648 100 0c n 5/27/29 25.2 35.1 8.23 5 108 648 100 0c n 5/27/29 25.2 35.0 8.24 4 108 648 100 0c n 5/27/29 25.2 35.0 8.24 4 108 648 100 0c n 5/27/29 25.2 35.0 8.23 4 109 656 100 0c n 5/29/29 19.4 34.8 8.18 5 110 662 50 r n 6/5/29/29 19.4 34.8 8.18 5 111 670 100 0c n 6/5/29 23.1 35.0 8.22 7 112 676 100 0c n 6/5/29 23.2 34.6 8.22 7 112 676 100 0c n 6/5/29 23.2 34.6 8.22 7 113 680 0 0c n 6/5/29 23.2 34.6 8.22 7 113 680 0 0c n 6/5/29 23.2 34.6 8.22 7   |         |           |           |               |         | 4/26/29    |                |           |        | 12                                |
| 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 97 578 50 r p 4/28/29 28.0 35.4 8.16 21 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 98 582 50 r n 1 4/30/29 26.9 35.3 8.16 28 99 589 0 oc n 5/2/29 27.9 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 100 596 50 oc n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 102 610 50 r n 5/9/29 25.8 35.0 8.24 12 102 610 50 r n 5/9/29 25.8 35.0 8.24 12 105 627 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 106 634 50 r n 5/15/29 26.8 34.9 8.23 5 106 635 100 r n 5/15/29 26.8 34.9 8.23 5 106 634 50 r n 5/15/29 26.8 34.9 8.23 5 106 635 100 r n 5/15/29 26.8 35.0 8.23 5 106 635 100 r n 5/17/29 27.0 35.0 8.23 5 106 635 100 r n 5/17/29 27.0 35.0 8.23 5 108 647 50 oc n 5/27/29 25.2 35.1 8.23 5 108 648 100 oc n 5/27/29 25.2 35.1 8.23 5 108 648 100 oc n 5/27/29 25.2 35.0 8.23 4 109 655 50 oc n 5/27/29 25.2 35.0 8.23 4 109 655 50 oc n 5/29/29 19.4 34.8 8.18 5 111 668 0 r n 6/5/29/29 19.4 34.8 8.18 5 111 670 100 oc n 6/5/29 21.7 34.6 8.22 7 112 675 50 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 19.8 34.7 8.20 8 112 677 0 r p 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7   |         |           |           | ос            |         | 4/28/29    |                | 35.2      | 8.16   | 24                                |
| 97 578 50   |         |           |           |               | n       | 4/28/29    |                |           |        |                                   |
| 98         581         0         r         n         4/30/29         27.0         35.3         8.16         24           98         582         50         r         n         4/30/29         26.9         35.3         8.16         28           99         589         0         oc         n         5/2/29         27.8         34.9         8.21         12           99         591         100         r         n         5/2/29         27.8         35.0         8.22         12           100         596         50         oc         n         5/2/29         27.8         34.9         8.21         12           100         596         50         oc         n         5/4/29         27.6         34.7         8.21         10           100         597         100         r         n         5/4/29         27.6         34.7         8.22         12           100         602         100         r         n         5/4/29         27.6         34.7         8.22         12           100         602         100         r         n         5/13/29         25.3         35.0         8.24         <  |         |           |           |               |         | 4/28/29    |                |           |        | 25                                |
| 98 582 50 r n 4/30/29 26.9 35.3 8.16 28 99 589 0 oc n 5/2/29 27.9 34.9 8.21 12 99 591 100 r n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.6 34.7 8.21 12 100 596 50 oc n 5/4/29 27.6 34.7 8.21 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r p 5/4/29 27.6 34.7 8.22 12 102 610 50 r n 5/9/29 27.6 34.7 8.22 12 102 610 50 r n 5/9/29 27.6 34.7 8.22 12 105 627 50 oc n 5/15/29 25.8 35.0 8.24 8 104 623 100 oc n 5/15/29 25.8 35.0 8.24 8 105 627 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.23 5 106 635 100 r n 5/17/29 27.0 35.0 8.23 5 108 647 50 oc n 5/17/29 27.0 35.0 8.23 5 108 647 50 oc n 5/17/29 27.0 35.0 8.23 4 109 655 50 oc n 5/27/29 26.8 35.0 8.24 4 108 648 100 oc n 5/27/29 26.8 35.0 8.24 4 108 648 100 oc n 5/27/29 26.8 35.0 8.24 4 108 648 100 oc n 5/27/29 26.8 35.0 8.23 5 110 662 50 r n 5/17/29 27.0 35.0 8.23 5 110 662 50 r n 5/17/29 27.0 35.0 8.23 5 111 670 100 oc n 6/3/29 20.1 34.5 8.18 5 110 662 50 r n 6/3/29 20.1 34.5 8.18 5 111 670 100 oc n 6/3/29 20.1 34.5 8.18 5 112 674 0 oc n 6/5/29 23.2 34.6 8.22 7 112 675 50 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 19.8 34.7 8.20 8 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.5 8.25 5  |         |           |           |               |         |            |                |           |        | 21                                |
| 99       589       0       oc       n       5/2/29       27.9       34.9       8.21       12         99       590       50       r       n       5/2/29       27.8       34.9       8.22       12         99       591       100       r       n       5/2/29       27.8       35.0       8.22       17         99       595       0       oc       n       5/2/29       27.9       34.9       8.21       12         100       596       50       oc       n       5/4/29       27.6       34.7       8.21       12         100       597       100       r       n       5/4/29       27.6       34.7       8.22       12         100       602       100       r       n       5/4/29       27.6       34.7       8.22       12         102       610       50       r       n       5/9/29       25.8       35.0       8.24       8         104       623       100       oc       n       5/15/29       25.3       35.3       8.21       7         105       627       50       oc       n       5/15/29       26.8 <td< td=""><td></td><td></td><td></td><td></td><td></td><td>4/30/29</td><td></td><td></td><td></td><td></td></td<>  |         |           |           |               |         | 4/30/29    |                |           |        |                                   |
| 99       590       50       r       n       5/2/29       27.8       34.9       8.22       12         99       591       100       r       n       5/2/29       27.8       35.0       8.22       17         99       595       0       oc       n       5/2/29       27.9       34.9       8.21       12         100       596       50       oc       n       5/4/29       27.6       34.7       8.21       10         100       692       100       r       p       5/4/29       27.6       34.7       8.22       12         100       602       100       r       p       5/4/29       27.6       34.7       8.22       12         100       602       100       r       p       5/4/29       27.6       34.7       8.22       12         102       610       50       r       n       5/9/29       25.8       35.0       8.24       8         102       610       50       r       n       5/15/29       26.8       34.9       8.23       5         105       628       50       oc       n       5/15/29       26.8 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>12</td></td<>   |         |           |           |               |         |            |                |           |        | 12                                |
| 99 591 100 r n 5/2/29 27.8 35.0 8.22 17 99 595 0 oc n 5/2/29 27.9 34.9 8.21 12 100 596 50 oc n 5/4/29 27.6 34.7 8.21 10 100 597 100 r n 5/4/29 27.6 34.7 8.22 12 100 602 100 r p 5/4/29 27.6 34.7 8.22 12 102 610 50 r n 5/9/29 25.8 35.0 8.24 8 104 623 100 oc n 5/13/29 25.3 35.3 8.21 7 105 627 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 25.2 35.1 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.23 5 106 635 100 r n 5/17/29 27.0 35.0 8.23 5 108 647 50 oc n 5/27/29 26.8 35.0 8.24 4 108 648 100 oc n 5/27/29 25.6 35.1 8.23 5 108 648 100 oc n 5/27/29 25.2 35.0 8.24 4 109 655 50 oc n 5/27/29 25.2 35.0 8.23 4 109 656 100 oc n 5/27/29 25.2 35.0 8.23 4 109 656 50 oc n 5/29/29 19.4 34.8 8.18 5 110 662 50 r n 6/3/29 18.4 34.8 8.16 7 111 670 100 oc n 6/3/29 18.4 34.8 8.16 7 112 675 50 oc n 6/5/29 23.2 34.6 8.22 7 112 675 50 oc n 6/5/29 23.2 34.6 8.23 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/5/29 23.2 34.5 8.25 5  |         |           |           |               |         |            |                |           |        | 12                                |
| 99 595 0 oc n 5/2/29 27.6 34.9 8.21 12 100 596 50 oc n 5/4/29 27.6 34.7 8.22 12 100 602 100 r n 5/4/29 27.6 34.7 8.22 12 102 610 50 r n 5/9/29 25.8 35.0 8.24 8 104 623 100 oc n 5/13/29 25.3 35.3 8.21 7 105 627 50 oc n 5/15/29 26.8 34.9 8.23 5 105 628 50 oc n 5/15/29 26.8 34.9 8.23 5 105 629 100 r n 5/15/29 25.2 35.1 8.23 5 106 634 50 r n 5/17/29 27.0 35.0 8.23 5 106 635 100 r n 5/17/29 27.0 35.0 8.23 5 108 647 50 oc n 5/17/29 25.6 35.1 8.23 5 108 648 100 oc n 5/27/29 26.8 35.0 8.24 4 109 655 50 oc n 5/27/29 26.8 35.0 8.24 4 109 655 50 oc n 5/27/29 25.2 35.1 8.23 5 110 662 50 r n 5/27/29 25.2 35.0 8.23 4 109 655 50 oc n 5/27/29 26.8 35.0 8.24 4 109 655 50 oc n 5/29/29 19.4 34.8 8.18 5 110 662 50 r n 6/3/29 18.4 34.8 8.16 7 111 668 0 r n 6/3/29 18.4 34.8 8.16 7 112 676 100 oc n 6/5/29 23.2 34.6 8.22 7 112 676 100 oc n 6/5/29 23.2 34.6 8.23 7 112 676 100 oc n 6/5/29 23.2 34.6 8.23 7 112 677 0 r p 6/5/29 23.2 34.6 8.22 7 113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         |            |                |           |        |                                   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | 99      | 595       | 0         |               |         | 5/ 2/29    | 27.9           | 34.9      | 8.21   | 12                                |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | 100     | 596       | 50        |               |         | 5/ 4/29    | 27.6           | 34.7      | 8.21   | 10                                |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 5/ 4/29    |                |           | 8.22   | 12                                |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 5/ 4/29    |                |           |        | 12                                |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 5/ 9/29    | 25.8           |           |        | 8                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         | 623       |           |               |         |            |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 5/15/29    |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 5/15/29    |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 5/17/29    |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         |            |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           | 50        |               |         |            |                |           |        | 4                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  | 108     | 648       | 100       |               |         | 5/27/29    |                | 35.0      | 8.23   | 4                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         | 655       | 50        |               |         | 5/29/29    | 23.1           |           |        | 3                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           | 100       | oc            | n       | 5/29/29    |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           | r             |         | 5/31/29    |                |           |        | 7                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 6/ 3/29    |                |           |        | 5                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         | 670       |           |               |         | 6/ 3/29    |                |           |        | 13                                |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         | 674       | 50        |               |         |            |                |           |        | 7                                 |
| 112 677 0 r p 6/5/29 23.2 34.6 8.22 7<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25 5  |         |           |           |               |         | 6/5/29     |                |           |        | 0                                 |
|   |         |           |           |               |         |            |                |           |        | 7                                 |
|   |         |           | 0         |               |         |            | 24.2           |           |        | 5                                 |
|   | 113     | 681       | 50        | r             | n       | 6/25/29    | 23.8           | 34.6      | 8.25   | 5                                 |

Table 36. Distributional and environmental records for Ceratium lunula -- Concluded

|            |            | Depth | Relative  | Appa-  |                      | Temperature  | Salinity     |              | PO4               |
|------------|------------|-------|-----------|--------|----------------------|--------------|--------------|--------------|-------------------|
| Station    | Sample     | (m)   | abundance | ratus  | Date                 | (°C)         | (0/00)       | pН           | mg/m <sup>3</sup> |
|            |            | (111) | abandance | ratus  | 1                    | ( 0)         | (0/00/       | L            | mg/m              |
| 113        | 682        | 100   | r         | n      | 6/25/29              | 21.5         | 34.7         | 8.23         | 8                 |
| 114        | 687        | 50    | oc oc     | n      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63                |
| 114        | 688        | 100   | oc        | n      | 6/27/29              | 13.0         | 34.5         | 8.00         | 91                |
| 114        | 690        | 50    | oc        | p      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63                |
| 115        | 692        | 0     | r         | n      | 6/29/29              | 20.6         | 34.6         | 8.19         | 4                 |
| 115        | 694        | 100   | r         | n      | 6/29/29              | 15.6         | 34.6         | 8.08         | 27                |
| 150        | 930        | 50    | r         | n      | 10/23/29             | 22.8         | 34.8         | 8.35         | 10                |
| 150        | 931        | 100   | r         | n      | 10/23/29             | 19.6         | 34.6         | 8.32         | 11                |
| 151        | 937        | 0     | r         | n      | 10/26/29             | 26.0         | 34.0         | *****        | ***               |
| 152        | 946        | 100   | С         | n      | 10/27/29             | 11.4         | 34.7         | 7.76         | 75                |
| 153        | 951        | 0     | ос        | n      | 10/29/29             | 28.1         | 34.2         | 8.47         | 7                 |
| 153        | 955        | 0     | r         | p      | 10/29/29             | 28.1         | 34.2         | 8.47         | 7 7               |
| 153        | 952        | 50    | oc        | n      | 10/29/29             | 28.1         | 34.4         | 8.39         |                   |
| 153        | 953        | 100   | r         | n      | 10/29/29             | 20.5         | 34.7         | 8.28         | 31                |
| 153        | 956        | 50    | r         | p      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                 |
| 154        | 959        | 50    | r         | n      | 10/31/29             | 28.2         | 34.2         | 8.40         | 7                 |
| 155        | 965        | 0     | r         | n      | 11/ 2/29             | 27.8         | 34.9         | 8.29         | 29                |
| 155        | 966        | 0     | r         | n      | 11/ 2/29             | 27.8         | 34.9         | 8.29         | 29                |
| 155<br>156 | 967<br>972 | 100   | oc        | n      | 11/ 2/29             | 27.2         | 35.0         | 8.30         | 35                |
| 156        | 973        | 0     | r         | n      | 11/ 4/29             | 27.6         | 35.0         | 8.34         | 28                |
| 156        | 974        | 100   | r         | p      | 11/ 4/29             | 27.6         | 35.0         | 8.34         | 28                |
| 157        | 978        | 0     | oc<br>c   | n<br>n | 11/ 4/29<br>11/ 6/29 | 26.4<br>27.1 | 35.1<br>35.3 | 8.30<br>8.27 | 48                |
| 157        | 979        | 50    | oc        | n      | 11/ 6/29             | 27.1         | 35.2         | 8.23         | 47<br>60          |
| 157        | 980        | 100   | r         | n      | 11/ 6/29             | 26.8         | 35.5         | 8.30         | 64                |
| 158        | 983        | 0     | oc        | n      | 11/ 8/29             | 28.2         | 35.6         | 8.34         | 36                |
| 158        | 984        | 50    | oc        | n      | 11/ 8/29             | 28.2         | 35.6         | 8.39         | 50                |
| 159        | 990        | Ö     | oc        | n      | 11/11/29             | 28.6         | 35.7         | 8.37         | 15                |
| 159        | 991        | 50    | oc        | n      | 11/11/29             | 28.5         | 35.7         | 8.39         | 15                |
| 159        | 992        | 100   | r         | n      | 11/11/29             | 28.0         | 35.7         | 8.37         | 23                |
| 160        | 1002       | 50    | r         | n      | 11/13/29             | 28.6         | 35.6         | 8.39         | 15                |
|            |            |       |           |        |                      |              |              |              |                   |

Table 37. Distributional and environmental records for Ceratium contortum

| Station | Sample | Depth (m)  | Relative abundance | Appa-<br>ratus | Date    | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub> mg/m <sup>3</sup> |
|---------|--------|------------|--------------------|----------------|---------|---------------------|--------------------|------|-----------------------------------|
| 1       | 1      | 0          | С                  | n              | 5/12/28 | 24.0                | 36.2               | 8.16 | 34                                |
| i       | 2      | 70         | oc                 | n              | 5/12/28 | (23.9               | 36.3               | 8.20 | 31)                               |
| la      | 3      | 0          | r                  | n              | 5/14/28 | (22.3               | 36.3               | 8.20 | 46)                               |
| 1a      | 4      | ŏ          | oc                 | n              | 5/14/28 | (22.3               | 36.3               | 8.20 | 46)                               |
| 12      | 5      | ő          | oc '               | n              | 5/14/28 | (22.3               | 36.3               | 8.20 | 46)                               |
| 1b      | 6      | ŏ          | oc                 | n              | 5/16/28 | (22.3               | 36.3               | 8.20 | 46)                               |
| 1b      | 7      | 50         | c                  | n              | 5/16/28 | (22.2               | 36.4               | 8.21 | 39)                               |
| 1b      | 8      | 100        | c                  | n              | 5/16/28 | (20.3               | 35.5               | 8.18 | 36)                               |
| 2       | 12     | 50         | c                  | n              | 5/18/28 | 20.5                | 36.4               | 8.21 | 46                                |
| 2       | 13     | 100        | oc                 | n              | 5/18/28 | 19.8                | 36.4               | 8.21 | 33                                |
| 2       | 14     | 0          | c                  | n              | 5/18/28 | 20.5                | 36.4               | 8.21 | 46                                |
| 13a     | 89     | Ö          | r                  | n              | 8/8/28  | (21.2               | 35.2               | 8.18 | 11)                               |
| 14      | 90     | Ö          | oc                 | n              | 8/ 8/28 | 21.2                | 35.2               | 8.18 | 11                                |
| 14      | 91     | 100        | oc                 | p              | 8/ 9/28 | 14.0                | 35.6               | 8.06 | 34                                |
| 14      | 93     | 0          | r                  | p              | 8/ 9/28 | 21.2                | 35.2               | 8.18 | 11                                |
| 14      | 95     | 50         | r                  | 'n             | 8/ 9/28 | 15.0                | 35.1               | 8.18 | 16                                |
| 15      | 97     | 0          | r                  | р              | 8/11/28 | 24.8                | 36.4               | 8.21 | 11                                |
| 15      | 101    | <b>√50</b> | r                  | n              | 8/11/28 | 19.8                | 36.5               | 8.21 | 8                                 |
| 15      | 102    | 100        | oc                 | n              | 8/11/28 | 18.4                | 36.4               | 8.20 | 19                                |
| 16      | 103    | 0          | r                  | р              | 8/13/28 | 25.9                | 36.2               | 8.24 | 8                                 |
| 16      | 106    | 0          | r                  | n              | 8/13/28 | 25.9                | 36.2               | 8.24 | 8                                 |
| 16      | 108    | 100        | r                  | n              | 8/13/28 | 19.9                | 36.5               | 8.17 | 13                                |
| 17      | 109    | 0          | r                  | р              | 8/15/28 | 26.2                | 36.6               | 8.29 | 9                                 |
| 17      | 110    | 50         | r                  | p              | 8/15/28 | 21.9                | 36.6               | 8.28 | 12                                |
| 17      | 111    | 0          | r                  | n              | 8/15/28 | 26.2                | 36.6               | 8.29 | 9                                 |
| 17      | 112    | 50         | r                  | n              | 8/15/28 | 21.9                | 36.6               | 8.28 | 12                                |
| 17      | 113    | 100        | r                  | n              | 8/15/28 | 19.3                | 36.5               | 8.23 | 95555555555                       |
| 18      | 115    | 50         | r                  | p              | 8/17/28 | 22.4                | 36.8               | 8.24 | 5                                 |
| 18      | 117    | 0          | oc                 | n              | 8/17/28 | 27.0                | 37.0               | 8.23 | 5                                 |
| 18      | 118    | 50         | С                  | n              | 8/17/28 | 22.4                | 36.8               | 8.24 | 5                                 |
| 18      | 119    | 100        | oc                 | n              | 8/17/28 | 20.4                | 36.8               | 8.21 | 5                                 |
| 19      | 120    | 0          | r                  | p              | 8/20/28 | 36.6                | 37.0               | 8.34 | 5                                 |
| 19      | 121    | 50         | r                  | p              | 8/20/28 | 25.2                | 37.1               | 8.27 | 5                                 |
| 19      | 122    | 0          | oc                 | n              | 8/20/28 | 26.6                | 37.0               | 8.34 | 5                                 |
| 19      | 123    | 50         | r                  | n              | 8/20/28 | 25.2                | 37.1               | 8.27 | 5                                 |
| 19      | 124    | 100        | o r                | n              | 8/20/28 | 22.4                | 37.0               | 8.25 | 5                                 |

Table 37. Distributional and environmental records for Ceratium contortum--Continued

| Station          | Sample      | Depth (m)       | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub> mg/m <sup>3</sup> |
|------------------|-------------|-----------------|--------------------|----------------|----------------------|------------------|--------------------|--------------|-----------------------------------|
| 20               | 125         | 0               | r                  | p              | 8/22/28              | 26.0             | 36.6               | 8.37         |                                   |
| 20               | 126         | 50              | oc                 | p              | 8/22/28              | 25.8             | 36.6               | 8.26         | 3                                 |
| 20               | 127         | 100             | r                  | p              | 8/22/28<br>8/22/28   | 22.6<br>26.0     | 36.7<br>36.6       | 8.19<br>8.37 | 5                                 |
| 20               | 128<br>129  | 0<br>50         | c<br>c             | n<br>n         | 8/22/28              | 25.8             | 36.6               | 8.26         | 3                                 |
| 20               | 130         | 100             | r                  | n              | 8/22/28              | 22.6             | 36.7               | 8.19         | 5                                 |
| 20-21            | 131         | 0               | oc                 | n              | 8/23/28<br>8/24/28   | (26.6<br>26.6    | 36.3<br>36.3       | 8.32<br>8.32 | 4)                                |
| 21<br>21         | 132<br>134  | 100             | r<br>a             | p<br>p         | 8/24/28              | 21.0             | 36.8               | 8.20         | 7                                 |
| 21               | 135         | 0               | С                  | n              | 8/24/28              | 26.6             | 36.3               | 8.32         | 5355354)<br>4744788               |
| 21<br>21         | 136<br>137  | 50<br>100       | oc                 | n<br>n         | 8/24/28<br>8/24/28   | 24.4<br>21.0     | 36.2<br>36.8       | 8.26<br>8.20 | 7                                 |
| 22               | 139         | 0               | c                  | p              | 8/27/28              | 26.7             | 36.0               | 8.26         | 8                                 |
| 22               | 142         | 0               | r                  | n              | 8/27/28              | 26.7<br>24.5     | 36.0<br>36.2       | 8.26<br>8.21 | 8<br>9                            |
| 22<br>22         | 143<br>144  | 50<br>100       | r                  | n<br>n         | 8/27/28<br>8/27/28   | 17.5             | 36.1               | 7.99         | 123                               |
| 23               | 145         | 0               | oc                 | p              | 8/29/28              | 27.2             | 35.9               | 8.25         | 4                                 |
| 23               | 148         | 0               | r                  | n              | 8/29/28              | 27.2<br>20.9     | 35.9<br>36.0       | 8.25<br>8.14 | 4<br>13                           |
| 23<br>23         | 149<br>150  | 50<br>100       | r                  | n<br>n         | 8/29/28<br>8/29/28   | 16.6             | 36.0               | 8.18         | 75                                |
| 24               | 151         | 0               | oc                 | n              | 8/31/28              | 27.2             | 35.2               | 8.32         | 75<br>4<br>4                      |
| 24               | 154         | 0               | oc                 | n              | 8/31/28<br>8/31/28   | 27.2<br>23.1     | 35.2<br>36.0       | 8.32<br>8.14 | 8                                 |
| 24<br>24         | 155<br>156  | 50<br>100       | oc                 | n<br>n         | 8/31/28              | 15.6             | 35.6               | 7.96         | 99                                |
| 25               | 157         | 0               | c                  | p              | 9/ 3/28              | 27.5             | 35.6               | 8.31         | 5                                 |
| 25               | 160<br>161  | 0<br>50         | oc                 | n<br>n         | 9/ 3/28<br>9/ 3/28   | 27.5<br>21.5     | 35.6<br>36.0       | 8.31<br>8.22 | 12                                |
| 25<br>25         | 162         | 100             | r                  | n              | 9/ 3/28              | 14.6             | 35.7               | 7.93         | 121                               |
| 26               | 163         | 0               | oc                 | p              | 9/ 5/28              | 27.6             | 36.0               | 8.30         | 5                                 |
| 26               | 166<br>167  | 0               | oc<br>r            | n              | 9/ 5/28<br>9/ 7/28   | 27.6<br>27.5     | 36.0<br>36.3       | 8.30<br>8.31 | 5 4                               |
| 27<br>27         | 171         | 50              | r                  | p<br>n         | 9/ 7/28              | 26.0             | 36.2               | 8.30         | 4                                 |
| 27               | 172         | 100             | r                  | n              | 9/ 7/28              | 17.7             | 36.0               | 8.09         | 46<br>4<br>4<br>7                 |
| 28<br>28         | 176<br>177  | 0<br>50         | oc<br>oc           | ņ<br>n         | 9/11/28<br>9/11/28   | 27.6<br>26.7     | 36.3<br>36.3       | 8.29<br>8.26 | 4                                 |
| 28               | 178         | 100             | r                  | n              | 9/11/28              | 22.8             | 36.6               | 8.22         | 7                                 |
| 29               | 179         | 0               | С                  | p              | 9/13/28              | 27.6             | 36.2<br>36.2       | 8.31<br>8.31 | 3<br>3<br>8<br>3                  |
| 29<br>29         | 182<br>183  | 0<br>50         | oc<br>r            | n<br>n         | 9/13/28<br>9/13/28   | 27.6<br>27.2     | 36.2               | 8.29         | 3                                 |
| 29               | 184         | 100             | oc                 | n              | 9/13/28              | . 23.1           | 36.6               | 8.21         | 8                                 |
| 30               | 186         | 50              | r                  | p              | 9/15/28<br>9/15/28   | 27.8<br>28.0     | 36.1<br>36.1       | 8.29<br>8.30 | 3                                 |
| 30<br>30         | 188<br>189  | 0<br>50         | oc<br>c            | n<br>n         | 9/15/28              | 27.8             | 36.1               | 8.29         | 3                                 |
| 30               | 190         | 100             | r                  | n              | 9/15/28              | 24.1             | 36.4               | 8.10<br>8.27 | 20<br>2<br>2                      |
| 31<br>31         | 191<br>192  | 0<br>50         | oc<br>r            | n<br>n         | 10/ 3/28<br>10/ 3/28 | 28.5<br>28.2     | 34.4<br>35.4       | 8.23         | 2                                 |
| 31               | 193         | 100             | ć                  | n              | 10/ 3/28             | 23.4             | 36.5               | 8.19         | 28                                |
| 32               | 194         | 0               | С                  | n              | 10/ 5/28             | 28.0             | 36.0<br>36.0       | 8.23<br>8.23 | 28<br>2<br>2                      |
| 32<br>32         | 194A<br>195 | 0<br>50         | oc<br>oc           | p<br>n         | 10/ 5/28<br>10/ 5/28 | 28.0<br>27.2     | 36.0               | 8.24         | 2                                 |
| 32               | 196         | 100             | oc                 | n              | 10/ 5/28             | 22.2             | 36.4               | 8.10         | 30                                |
| 32               | 196A        | 100             | r                  | p              | 10/ 5/28<br>10/ 8/28 | 22.2<br>28.5     | 36.4<br>35.6       | 8.10<br>8.23 | 30<br>4                           |
| 33<br>33         | 197A<br>198 | 0<br><b>5</b> 0 | oc<br>oc           | p<br>n         | 10/ 8/28             | 28.2             | 36.2               | 8.24         | 4                                 |
| 34               | 200         | 0               | С                  | n              | 10/ 9/28             | 28.5             | 35.9               | 8.28         | 2                                 |
| 34               | 200A        | 0<br>100        | oc                 | p<br>n         | 10/ 9/28<br>10/ 9/28 | 28.5<br>20.5     | 35.9<br>36.6       | 8.28<br>8.16 | 2<br>16                           |
| 34<br>34         | 201<br>202  | 50              | oc                 | n              | 10/ 9/28             | 25.0             | 36.5               | 8.21         | 3                                 |
| 35               | 204         | 50              | r                  | n              | 10/26/28             | 16.8             | 34.7               | 7.92         | 138<br>15                         |
| 35               | 206<br>208  | 0               | oc<br>r            | p<br>n         | 10/26/28<br>10/26/28 | 27.4<br>(27.0    | 29.7<br>30.7       | 8.31<br>8.27 | 16)                               |
| 35a<br>35-36     | 209         | . 0             | oc                 | n              | 10/26/28             | (27.0            | 30.7               | 8.27         | 16)                               |
| 35-36            | 212         | 0               | oc                 | n              | 10/26/28             | (27.0<br>26.5    | 30.7<br>31.6       | 8.27<br>8.23 | 16)<br>16                         |
| 36<br><b>3</b> 6 | 213<br>214  | 0<br>50         | r                  | n<br>n         | 10/30/28<br>10/30/28 | 18.5             | 34.5               | 8.03         | 122                               |
| 37               | 218         | 50              | r                  | n              | 11/ 1/28             | 18.8             | 34.5               | 8.00         | 121                               |
| 39               | 225         | 0               | r                  | n              | 11/ 6/28<br>11/ 8/28 | 24.8<br>22.2     | 33.0<br>33.7       | 8.24<br>8.21 | 16<br>24                          |
| 40<br>41         | 232<br>235  | 0               | r                  | p<br>n         | 11/10/28             | 20.4             | 34.2               | 8.11         | 32                                |
| 41a              | 240         | 0               | г                  | n              | 11/19/28             | (22.4            | 35.3               | 8.12         | 38)                               |
| 45               | 256         | 50              | c                  | n<br>n         | 11/19/28<br>11/19/28 | 22.4<br>22.4     | 35.3<br>35.2       | 8.12<br>8.13 | 38<br>46                          |
| 45<br>45         | 257<br>258  | 50<br>100       | oc                 | n              | 11/19/28             | 18.6             | 35.1               | 8.00         | 50                                |
| 46               | 261 .       | 0               | ос                 | n              | 11/21/28             | 23.3<br>23.2     | 35.3<br>35.3       | 8.16<br>8.16 | 36<br>40                          |
| 46               | 262         | 50<br>100       | 00                 | n<br>n         | 11/21/28<br>11/21/28 | 22.5             | 35.4               | 8.17         | 40                                |
| 46               | 263         | 100             | oc                 | 11             | 11/21/20             | 2210             |                    |              |                                   |

Table 37. Distributional and environmental records for Ceratium contortum -- Continued

| Station   | Sample  | Depth (m)   | Relative abundance   | Appa-  |  | Temperature   | Salinity<br>(0/00)   | рН   | PO <sub>4</sub>  |
|---|---|---|--|--|--|---|--|--|--|
| 47<br>47<br>47<br>48<br>48<br>48<br>48<br>48<br>49<br>49<br>49<br>49<br>49<br>49<br>50<br>50<br>50<br>50<br>50<br>50                      | 266<br>267<br>268<br>269<br>271<br>272<br>273<br>274<br>275<br>276<br>277<br>278<br>279<br>281<br>282<br>283<br>284<br>285<br>286<br>287<br>288<br>289<br>290 | (m)  0 50 100 0 50 100 0 50 100 0 50 100 0 50 100 0 50 100 0 50 100 0 50 100 0 50 100 0 | abundance  r r r r r r r oc oc oc r r r oc | ratus  n n n p n n p p n n n p p p n n n p p n n n p p n n n n p p n n n n p p n n n n n p p n n n n n p p n n n n n p p n n n n n p p n n n n n p p p p n n n n n p p p p n n n n n p p p n n n n n p p p p n n n n n p p p n n n n n p p p n n n n n p p p n n n n n p p p n n n n n p p p n n n n n p p p n n n n n p p p n n n n n p p p n n n n n p p p p n n n n n p p p p n n n n n p p p n n n n n p p p p n n n n n p p p p n n n n n p p p p n n n n n p p p p n n n n n p p p n n n n n p p p p n n n n n p p p p n n n n n p p p n n n n n p p p n n n n n p p p p n n n n n n p p p n n n n n n p p p p n n n n n n p p p p n n n n n n p p p p n n n n n n p p p p n n n n n n n p p p p n n n n n n n p p p p n n n n n n n n p p p p n n n n n n n n p p p p n | 11/23/28<br>11/23/28<br>11/23/28<br>11/25/28<br>11/25/28<br>11/25/28<br>11/25/28<br>11/25/28<br>11/25/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/27/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28<br>11/29/28 | (°C) 23.9 23.8 22.7 23.9 23.6 23.6 23.6 23.7 23.6 23.4 22.6 21.6 21.6 (23.2 22.0 20.5 23.2 22.0 20.5 (22.8  | (o/oo)  36.0 36.2 36.4 36.4 36.4 36.3 36.2 36.1 35.9 36.0 35.7 36.0 35.7 35.6  | 8.23<br>8.23<br>8.23<br>8.24<br>8.26<br>8.27<br>8.26<br>8.27<br>8.26<br>8.26<br>8.23<br>8.23<br>8.23<br>8.23<br>8.23<br>8.23<br>8.23<br>8.23 | mg/m <sup>3</sup> 17 20 20 17 13 16 16 13 13 13 13 13 13 13 13 13 13 13 13 16 16                 |
| 50-51<br>50-51<br>51<br>51<br>51<br>51<br>52<br>52<br>52<br>52<br>53<br>53<br>53-54<br>53-54<br>53-54<br>53-54<br>53-54<br>53-54<br>53-54 | 291<br>292<br>293<br>294<br>295<br>296<br>297<br>299<br>300<br>301<br>302<br>304<br>305<br>306<br>307<br>308<br>311<br>312<br>313<br>316<br>317               | 50<br>100<br>50<br>50<br>100<br>50<br>100<br>50<br>100<br>0<br>0<br>0<br>0              | oc oc oc oc r oc c r r a o o o r c   |  | 11/30/28<br>11/30/28<br>11/30/28<br>11/30/28<br>12/1/28<br>12/1/28<br>12/1/28<br>12/3/28<br>12/3/28<br>12/3/28<br>12/5/28<br>12/5/28<br>12/5/28<br>12/6/28<br>12/10/28<br>12/10/28<br>12/10/28<br>12/10/28<br>12/10/28<br>12/10/28<br>12/12/28<br>12/12/28   | (22.8<br>(22.8<br>22.8<br>20.5<br>20.0<br>22.8<br>20.5<br>22.5<br>20.2<br>18.2<br>22.5<br>21.2<br>19.9<br>22.6<br>(23.0<br>(23.0<br>(23.0<br>(23.0<br>(23.0<br>(23.0<br>(23.0 | 35.6<br>35.6<br>35.6<br>35.6<br>35.6<br>35.6<br>35.2<br>35.4<br>35.6<br>35.6<br>35.6<br>35.6<br>35.6<br>35.6<br>35.6<br>35.6 | 8.22<br>8.22<br>8.22<br>8.22<br>8.22<br>8.22<br>8.21<br>8.21   | 16)<br>16)<br>16<br>17<br>17<br>16<br>17<br>18<br>8<br>8<br>13<br>13<br>11)<br>11)<br>11)<br>11) |
| 54<br>54<br>55<br>55<br>55<br>55<br>56<br>56<br>56<br>56<br>57<br>57<br>57  | 320<br>321<br>322<br>323<br>324<br>325<br>326<br>329<br>330<br>331<br>332<br>333<br>334<br>335<br>336<br>337<br>338   | 50<br>100<br>0<br>50<br>100<br>0<br>50<br>100<br>0<br>50<br>100<br>0<br>50<br>100<br>0  | oc o   | n<br>p<br>n<br>n<br>p<br>n<br>n<br>p<br>p<br>n<br>n  | 12/14/28<br>12/14/28<br>12/14/28<br>12/16/28<br>12/16/28<br>12/16/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/18/28<br>12/19/28<br>12/20/28<br>12/20/28<br>12/20/28   | 19.8<br>18.7<br>23.4<br>20.4<br>18.7<br>16.7<br>20.8<br>18.5<br>16.6<br>20.8<br>18.5<br>16.6<br>(19.0<br>19.0<br>19.0<br>15.6<br>14.3<br>19.0                                 | 35.4<br>35.5<br>35.5<br>34.9<br>34.9<br>34.9<br>35.1<br>34.8<br>34.5<br>34.5<br>34.5<br>34.5<br>34.5                         | 8.18<br>8.16<br>8.22<br>8.19<br>8.13<br>8.14<br>8.11<br>8.14<br>8.14<br>8.14<br>8.14<br>8.14<br>8.14   | 17<br>20<br>9<br>12<br>12<br>12<br>12<br>12<br>9<br>9<br>12<br>20)<br>20<br>21<br>40<br>20       |
| 57<br>57<br>58<br>59<br>61-62<br>63<br>63<br>63<br>63<br>63<br>63-64<br>63-64<br>63-64  | 339<br>340<br>346<br>347<br>370<br>379<br>380<br>381<br>382<br>384<br>385<br>386<br>387   | 50<br>100<br>100<br>0<br>0<br>50<br>100<br>0<br>100<br>0                                | r<br>r<br>r<br>r<br>r<br>r<br>r  | p<br>p   | 12/20/28<br>12/20/28<br>12/22/28<br>12/24/28<br>12/28/28<br>1/ 1/29<br>1/ 1/29<br>1/ 1/29<br>1/ 1/29<br>1/ 1/29<br>1/ 1/29<br>1/ 1/29<br>1/ 1/29   | 15.6<br>14.3<br>12.3<br>16.3<br>(16.9<br>20.5<br>17.0<br>15.6<br>20.5<br>15.6<br>(20.5<br>(20.5<br>(20.5  | 34.3<br>34.4<br>34.0<br>34.6<br>34.6<br>34.6<br>34.6<br>34.6<br>34.6<br>34.6   | 8.14<br>8.10<br>8.05<br>8.10<br>8.05<br>8.07<br>8.08<br>8.08<br>8.08<br>8.07<br>8.08<br>8.07<br>8.07   | 21<br>40<br>40<br>38<br>46)<br>21<br>25<br>24<br>21<br>24<br>21)<br>21)                          |

Table 37. Distributional and environmental records for Ceratium contortum -- Continued

| Ta       | ble 37. D   | istributio | onal and envir     | onmenta        | l records                     | for Ceratium c      | ontortum                     | -Contin      | ued                                  |
|----------|-------------|------------|--------------------|----------------|-------------------------------|---------------------|------------------------------|--------------|--------------------------------------|
| Station  | Sample      | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                          | Temperature<br>(°C) | Salinity<br>(0/00)           | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 63-64    | 388         | 0          | r                  | n              | 1/1/29                        | (20.5               | 34.6                         | 8.07         | 21)                                  |
| 63-64    | 390         | ŏ          | r                  | n              | 1/ 1/29<br>1/ 1/29<br>1/ 1/29 | (20.5               | 34.6                         | 8.07         | 21)                                  |
| 63-64    | 391         | 0          | r                  | n              | 1/ 1/29                       | (20.5               | 34.6                         | 8.07         | 21)                                  |
| 63-64    | 392         | 0          | r                  | n              | 1/ 1/29<br>1/ 1/29            | (20.5               | 34.6                         | 8.07         | 21)                                  |
| 63-64    | 393         | 0          | r                  | n              | 1/ 1/29                       | (20.5               | 34.6                         | 8.07         | 21)                                  |
| 64<br>64 | 394<br>398  | 0          | r                  | n              | 1/ 3/29<br>1/ 3/29            | 20.6<br>20.6        | 34.6                         | 8.12         | 21<br>21                             |
| 64-65    | 401         | 0          | r                  | p<br>n         | 1/ 3/29                       | (20.6               | 34.6<br>34.6                 | 8.12<br>8.12 | 21)                                  |
| 64-65    | 402         | ŏ          | r                  | . n            | 1/ 3/29                       | (20.6               | 34.6                         | 8.12         | 21)                                  |
| 65       | 405         | Ŏ          | oc                 | n              | 1/ 5/29                       | 20.2                | 34.5                         | 8.10         | 24                                   |
| 65       | 408         | 0          | r                  | p              | 1/ 5/29                       | 20.2                | 34.5                         | 8.10         | 24                                   |
| 66       | 411         | 0          | r                  | n              | 1/ 7/29                       | 19.4                | 34.7                         | 8.10         | 29                                   |
| 66<br>66 | 412<br>414  | 100<br>50  | r                  | n              | 1/ 7/29<br>1/ 7/29            | 17.8<br>17.8        | 34.9<br>34.8                 | 8.12<br>8.10 | 21<br>29                             |
| 67       | 416         | 0          | oc                 | p<br>n         | 1/ 8/29                       | 19.3                | 34.9                         | 8.11         | 21                                   |
| 67       | 417         | 50         | r                  | n              | 1/ 8/29                       | 17.4                | 34.7                         | 8.11         | 20                                   |
| 67       | 418         | 100        | oc '               | n              | 1/8/29                        | 16.2                | 34.6                         | 8.05         | 40                                   |
| 68       | 419         | 0          | r                  | n              | 1/10/29                       | 19.2                | 35.1                         | 8.14         | 29                                   |
| 68       | 420         | 50         | r                  | n              | 1/10/29                       | 18.2                | 35.0                         | 8.14         | 29                                   |
| 68       | 422         | 0          | r                  | p              | 1/10/29<br>1/12/29            | 19.2<br>21.1        | 35.1<br>35.2                 | 8.14         | 29<br>62                             |
| 69<br>69 | 424<br>426  | 100        | oc<br>r            | n<br>n         | 1/12/29                       | 14.6                | 34.8                         | 8.12<br>7.86 | 198                                  |
| 69       | 427         | 0          | r                  | p              | 1/12/29                       | 21.1                | 35.2                         | 8.12         | 62                                   |
| 75       | 462         | Ō          | r                  | 'n             | 2/14/29                       | 22.8                | 35.8                         | 8.18         | 44                                   |
| 75       | 463         | 50         | r                  | n              | 2/14/29                       | 20.0                | 35.5                         | 8.14         | 46                                   |
| 75       | 464         | 100        | oc                 | n              | 2/14/29                       | 17.8                | 35.4                         | 8.00         | 75                                   |
| 75<br>76 | 466<br>467  | 50<br>0    | r                  | p              | 2/14/29<br>2/16/29            | 20.0<br>23.4        | 35.5<br>35.9                 | 8.14<br>8.15 | 46<br>50                             |
| 76       | 469         | 100        | c<br>r             | n<br>n         | 2/16/29                       | 21.2                | <b>35.</b> 8                 | 8.12         | 45                                   |
| 77       | 472         | 0          | oc                 | n              | 2/18/29                       | 23.7                | 36.0                         | 8.19         | 16                                   |
| 77       | 473         | 0          | r                  | p              | 2/18/29                       | 23.7                | 36.0                         | 8.19         | 16                                   |
| 78       | 475         | 0          | oc                 | n              | 2/20/29                       | 24.6                | 36.0                         | 8.17         | 32                                   |
| 78       | 477         | 100        | oc                 | n              | 2/20/29                       | 21.9                | 36.2                         | 8.14         | 34                                   |
| 79<br>79 | 482<br>483  | 50<br>100  | oc<br>c            | n<br>n         | 2/22/29<br>2/22/29            | 24.5<br>21.8        | 36.1<br>36.2                 | 8.17<br>8.13 | 34<br>45                             |
| 79       | 484         | 0          | r                  | p              | 2/23/29                       | 25.2                | 36.0                         | 8.17         | 34                                   |
| 80       | 486         | ő          | r                  | n              | 2/24/29                       | 26.0                | 35.9                         | 8.20         | 36                                   |
| 80       | 488         | 0          | r                  | p              | 2/24/29                       | 26.0                | 35.9                         | 8.20         | 36                                   |
| 80       | 489         | 50         | oc                 | p              | 2/24/29                       | 25.9                | 36.0                         | 8.19         | 29                                   |
| 81       | 491<br>492  | 0<br>50    | oc                 | n              | 2/26/29<br>2/26/29            | 26.5<br>26.4        | <b>35</b> .8<br><b>35</b> .9 | 8.19<br>8.19 | 38<br>38                             |
| 81<br>82 | 496         | 0          | oc<br>oc           | n<br>n         | 2/28/29                       | 27.2                | 36.3                         | 8.21         | 34                                   |
| 82       | 497         | 50         | oc                 | n              | 2/28/29                       | 27.2                | 36.3                         | 8.21         | 34                                   |
| 82       | 498         | 0          | oc                 | p              | 2/28/29                       | 27.2                | 36.3                         | 8.21         | 34                                   |
| 83       | 501         | 0          | oc                 | n              | 3/ 2/29                       | 27.5                | 36.3                         | 8.24         | 29                                   |
| 83<br>83 | 502<br>503  | 50<br>0    | c<br>r             | n              | 3/ 2/29<br>3/ 2/29            | 27.4<br>27.5        | 36.5<br>36.3                 | 8.24<br>8.24 | 25<br>29                             |
| 83       | 504         | 50         | r                  | p<br>p         | 3/ 2/29                       | 27.4                | 36.5                         | 8.24         | 25                                   |
| 84       | 505         | 0          | r                  | 'n             | 3/4/29                        | 27.8                | 36.2                         | 8.23         | 24                                   |
| 84       | 506         | 50         | oc                 | n              | 3/ 4/29                       | 27.5                | 36.4                         | 8.21         | 24                                   |
| 84       | 508         | 50         | · r                | p              | 3/ 4/29                       | 27.5                | 36.4                         | 8.21<br>8.22 | 24                                   |
| 85<br>85 | 510<br>511  | 0<br>50    | oc<br>oc           | n<br>n         | 3/ 6/29<br>3/ 6/29            | 27.9<br>27.8        | 36.2<br>36.2                 | 8.22         | 40<br>40                             |
| 85       | 512         | 0          | r                  | p              | 3/6/29                        | 27.9                | 36.2                         | 8.22         | 40                                   |
| 85       | 513         | 50         | oc                 | p              | 3/6/29                        | 27.8                | 36.2                         | 8.22         | 40                                   |
| 86       | 515         | 0          | oc                 | n              | 3/ 9/29                       | (28.3               | 36.2                         | 8.29         | 20)                                  |
| 86       | 516         | 0          | oc                 | n              | 3/ 9/29                       | 28.3                | 36.2                         | 8.29         | 20                                   |
| 86<br>86 | 517<br>518  | 50<br>0    | 00                 | n              | 3/ 9/29<br>3/ 9/29            | 27.4<br>28.3        | 36.2<br>36.2                 | 8.29<br>8.29 | 17<br>20                             |
| 87       | 521         | 0          | oc                 | p<br>n         | 3/11/29                       | 27.8                | 36.1                         | 8.28         | 17                                   |
| 87       | 522         | 50         | oc                 | n              | 3/11/29                       | 26.5                | 36.1                         | 8.26         | 20                                   |
| 87       | 523         | 0          | r                  | p              | 3/11/29                       | 27.8                | 36.1                         | 8.28         | 17                                   |
| 87       | 524         | 50         | r                  | p              | 3/11/29                       | 26.5                | 36.1                         | 8.26         | 20                                   |
| 87       | 525         | 100        | r                  | p              | 3/11/29                       | 23.9<br>28.5        | 36.0<br>35.9                 | 8.23<br>8.23 | 20<br>16                             |
| 88<br>88 | 526<br>527  | 0<br>50    | oc                 | n<br>n         | 3/21/29<br>3/21/29            | 28.5<br>28.4        | 35.9<br>35.9                 | 8.25         | 13                                   |
| 89       | <b>52</b> 8 | 0          | oc                 | n              | 3/23/29                       | 28.4                | 35.6                         | 8.25         | 21                                   |
| 89       | 529         | 50         | r                  | n              | 3/23/29                       | 28.6                | 35.8                         | 8.27         | 12                                   |
| 89       | 530         | 0          | r                  | p              | 3/23/29                       | 28.4                | 35.6                         | 8.25         | 21                                   |
| 90       | 533         | 0          | С                  | n              | 3/25/29                       | 28.5                | 35.5                         | 8.27         | 21                                   |
| 90       | 534         | 50         | C                  | n              | 3/25/29                       | 28.6<br>28.5        | 35.6<br>35.5                 | 8.26<br>8.27 | 21<br>21                             |
| 90       | 535<br>536  | 0<br>50    | 00                 | p              | 3/25/29<br>3/25/29            | 28.5                | 35.6                         | 8.26         | 21                                   |
| 90<br>91 | 540         | 0          | oc<br>oc           | p<br>n         | 3/27/29                       | 28.7                | 35.1                         | 8.30         | 21                                   |
| 91       | 541         | 50         | c                  | n              | 3/27/29                       | 28.5                | 35.2                         | 8.30         | 24                                   |
| 91       | 542         | 0          | r                  | p              | 3/27/29                       | 28.7                | 35.1                         | 8.30         | 21                                   |
|          |             |            |                    |                |                               |                     |                              |              |                                      |

Table 37. Distributional and environmental records for Ceratium contortum--Continued

| Station    | Sample     | Depth (m)       | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO4<br>mg/m <sup>3</sup>   |
|------------|------------|-----------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|----------------------------|
|            |            | (111)           | abdituance         | Tatus          |                    | ( 0)                | (0/00)             |              | mg/m                       |
| 91         | 543        | 50              | $\mathbf{r}$       | p              | 3/27/29            | 28.5                | 35.2               | 8.30         | 21                         |
| 91         | 544        | 100             | r                  | p              | 3/27/29            | 25.8                | 36.0               | 8.25         | 30                         |
| 92<br>92   | 545<br>546 | 0<br><b>5</b> 0 | oc<br>c ·          | n<br>n         | 3/29/29<br>3/29/29 | 28.5<br>28.4        | 35.3<br>35.4       | 8.29<br>8.29 | 28<br>28                   |
| 92         | 548        | 50              | r                  | p              | 3/29/29            | 28.4                | 35.4               | 8.29         | 28                         |
| 93         | 551        | 50              | c                  | 'n             | 3/31/29            | 28.5                | 34.8               | 8.30         | 28                         |
| 94         | 558        | 50              | oc                 | n              | 4/22/29            | 29.3                | 34.7               | 8.25         | 14                         |
| 94         | 559        | 100             | oc                 | n              | 4/22/29            | 28.5                | 35.6               | 8.21         | 25                         |
| 95<br>95   | 563<br>564 | 50<br>100       | c<br>oc            | n<br>n         | 4/24/29<br>4/24/29 | 29.3<br>28.5        | 34.9<br>35.4       | 8.24<br>8.22 | 16<br>21                   |
| 95         | 566        | 50              | r                  | p              | 4/24/29            | 29.3                | 34.9               | 8.24         | 16                         |
| 96         | 568        | 0               | oc                 | 'n             | 4/26/29            | 29.3                | 35.3               | 8.23         | 12                         |
| 95         | 568A       | 0               | oc                 | n              | 4/26/29            | (29.4               | 34.7               | 8,26         | 14)                        |
| 96<br>96   | 569<br>571 | 50<br>0         | r                  | n              | 4/26/29<br>4/26/29 | 29.2<br>29.3        | 35.3<br>35.3       | 8.23<br>8.23 | 12<br>12                   |
| 97         | 574        | ŏ               | c                  | p<br>n         | 4/28/29            | 28.3                | 35.2               | 8.16         | 24                         |
| 97         | 575        | 50              | c                  | n              | 4/28/29            | 28.0                | 35.4               | 8.16         | 21                         |
| 97         | 576        | 100             | oc                 | n              | 4/28/29            | 27.6                | 35.6               | 8.15         | 25                         |
| 97         | 577        | 0               | r                  | p              | 4/28/29            | 28.3                | 35.2               | 8.16         | 24                         |
| 97<br>98   | 578<br>581 | 50<br>0         | r                  | p<br>n         | 4/28/29<br>4/30/29 | 28.0<br>27.0        | 35.4<br>35.3       | 8.16<br>8.16 | 21<br>24                   |
| 99         | 589        | ŏ               | c                  | n              | 5/ 2/29            | 27.9                | 34.9               | 8.21         | 12                         |
| 99         | 590        | 50              | c                  | n              | 5/ 2/29            | 27.8                | 34.9               | 8.22         | 12                         |
| 99         | 591        | 100             | С                  | n              | 5/ 2/29            | 27.8                | 35.0               | 8.22         | 17                         |
| 99         | 592<br>595 | 0               | r                  | p              | 5/ 2/29<br>5/ 2/29 | 27.9                | 34.9<br>34.9       | 8.21         | 12                         |
| 99<br>100  | 596        | 50              | r<br>c             | n<br>n         | 5/ 2/29<br>5/ 4/29 | 27.9<br>27.6        | 34.7               | 8.21<br>8.21 | 12<br>10                   |
| 100        | 597        | 100             | c                  | n              | 5/ 4/29            | 27.6                | 34.7               | 8.22         | 12                         |
| 100        | 598        | 0               | r                  | p              | 5/ 4/29            | 27.7                | 34.7               | 8.21         | 10                         |
| 100        | 602        | 100             | r                  | p              | 5/ 4/29            | 27.6                | 34.7               | 8.22         | 12                         |
| 101<br>101 | 603<br>604 | 0<br>50         | oc                 | n              | 5/ 7/29<br>5/ 7/29 | 26.3<br>26.2        | 34.7<br>34.7       | 8.24<br>8.24 | 8                          |
| 101        | 605        | 100             | oc<br>oc           | n<br>n         | 5/ 7/29            | 25.2                | 35.1               | 8.23         | 8                          |
| 101        | 607        | 50              | r                  | p              | 5/ 7/29            | 26.2                | 34.7               | 8.24         | 8                          |
| 102        | 609        | 0               | С                  | n              | 5/ 9/29            | 25.8                | 35.0               | 8.24         | 8                          |
| 102        | 610        | 50              | С                  | n              | 5/ 9/29            | 25.8                | 35.0               | 8.24<br>8.23 | 8                          |
| 102<br>102 | 611<br>612 | 100             | oc<br>r            | n<br>p         | 5/ 9/29<br>5/ 9/29 | 25.6<br>25.8        | 35.0<br>35.0       | 8.24         | 8<br>8<br>8                |
| 102        | 613        | 50              | r                  | p              | 5/ 9/29            | 25.8                | 35.0               | 8.24         | 8                          |
| 102        | 614        | 100             | r                  | p              | 5/ 9/29            | 25.6                | 35.0               | 8.23         | 8                          |
| 103        | 615        | 0               | С                  | n              | 5/11/29            | 26.0                | 35.0               | 8.25         | 8<br>5<br>5<br>7           |
| 103<br>103 | 616<br>617 | 50<br>100       | c<br>c             | n<br>n         | 5/11/29<br>5/11/29 | 25.8<br>24.8        | 35.2<br>35.2       | 8.25<br>8.25 | 5                          |
| 104        | 621        | 0               | oc                 | n              | 5/13/29            | 26.1                | 35.2               | 8.24         | 7                          |
| 104        | 622        | 50              | c                  | n              | 5/13/29            | 25.8                | 35.2               | 8.24         | 7                          |
| 104        | 623        | 100             | c                  | n              | 5/13/29            | 25.3                | 35.3               | 8.21         | 7                          |
| 104        | 626<br>627 | 100<br>50       | r                  | p              | 5/13/29<br>5/15/29 | 25.3<br>26.8        | 35.3<br>34.9       | 8:21<br>8.23 | 5                          |
| 105<br>105 | 628        | 50              | c<br>oc            | n<br>n         | 5/15/29            | 26.8                | 34.9               | 8.23         | 5                          |
| 106        | 633        | 0               | oc                 | n              | 5/17/29            | 27.2                | 35.0               | 8.23         | 5                          |
| 106        | 634        | 50              | С                  | n              | 5/17/29            | 27.0                | 35.0               | 8.23         | 5                          |
| 106        | 635        | 100             | oc                 | n              | 5/17/29<br>5/17/29 | 25.6                | 35.1<br>35.0       | 8.23<br>8.23 | 7<br>5<br>5<br>5<br>5<br>5 |
| 106<br>107 | 636<br>639 | 0               | r<br>c             | p<br>n         | 5/17/29 5/19/29    | 27.2<br>28.0        | 35.0<br>34.4       | 8.23         | 5                          |
| 107        | 640        | 50              | c                  | n              | 5/19/29            | 27.9                | 34.4               | 8.23         | 4                          |
| 107        | 641        | 100             | С                  | n              | 5/19/29            | 26.8                | 34.9               | 8.23         | 11                         |
| 107        | 642        | 100             | r                  | p              | 5/19/29            | 28.0                | 34.4               | 8.23<br>8.23 | 5<br>11                    |
| 107<br>108 | 644<br>646 | 100             | r<br>c             | p<br>n         | 5/19/29<br>5/27/29 | 26.8<br>28.4        | 34.9<br>35.0       | 8.25         | 4                          |
| 108        | 648        | 100             | oc                 | n              | 5/27/29            | 25.2                | 35.0               | 8.23         | 4<br>3<br>3<br>5<br>3<br>7 |
| 109        | 654        | 0               | r                  | n              | 5/29/29            | 27.4                | 35.0               | 8.23         | 3                          |
| 109        | 655        | 50              | oc                 | n              | 5/29/29            | 23.1                | 35.0               | 8.22         | 3                          |
| 109        | 656        | 100             | oc                 | n              | 5/29/29<br>5/29/29 | 19.4<br>23.1        | 34.8<br>35.0       | 8.18<br>8.22 | 3                          |
| 109<br>110 | 658<br>661 | 50<br>0         | oc<br>a            | p<br>n         | 5/31/29            | 23.9                | 34.7               | 8.18         | 5                          |
| 110        | 662        | 50              | oc                 | n              | 5/31/29            | 18.4                | 34.8               | 8.16         | 7                          |
| 110        | 663        | 100             | С                  | n              | 5/31/29            | 17.9                | 34.7               | 8.14         | 11                         |
| 110        | 664        | 0               | c                  | p              | 5/31/29            | 23.9                | 34.7               | 8.18         | 5                          |
| 110        | 665        | 50              | oc                 | p              | 5/31/29<br>5/31/29 | 18.4<br>17.9        | 34.8<br>34.7       | 8.16<br>8.14 | 7<br>11                    |
| 110<br>111 | 666<br>668 | 100             | oc oc              | p<br>n         | 6/ 3/29            | 20.1                | 34.5               | 8.18         | 5                          |
| 111        | 670        | 100             | oc                 | n              | 6/ 3/29            | 18.2                | 34.7               | 8.13         | 13                         |
| 111        | 671        | 0               | r                  | p              | 6/ 3/29            | 20.1                | 34.5               | 8.18         | 5                          |
| 111        | 672        | 50              | r                  | p              | 6/ 3/29            | 19.4<br>23.2        | 34.6<br>34.6       | 8.17<br>8.22 | 5<br>7                     |
| 112        | 674<br>675 | 0<br>50         | oc                 | n<br>n         | 6/ 5/29<br>6/ 5/29 | 21.7                | 34.6               | 8.23         | 7                          |
| 112        | 010        | 30              | ос                 | - 11           | 3/ 3/23            | 21.1                | 04.0               | 0.20         |                            |

Table 37. Distributional and environmental records for Ceratium contortum -- Continued

| Station    | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m         |
|------------|------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|---------------------------------|
| 112        | 676        | 100       | r                  | n              | 6/ 5/29              | 19.8                | 34.7               | 8.20         | 8                               |
| 112        | 677        | 0         | r                  | p              | 6/ 5/29              | 23.2                | 34.6               | 8.22         | 7<br>5<br>5<br>8<br>5<br>5<br>8 |
| 113        | 680        | 0         | oc                 | n              | 6/25/29              | 24.2                | 34.5               | 8.25         | 5                               |
| 113        | 681        | 50        | С                  | n              | 6/25/29              | 23.8                | 34.6               | 8.25         | 5                               |
| 113        | 682        | 100       | С                  | n              | 6/25/29              | 21.5                | 34.7<br>34.5       | 8.23<br>8.25 | 8<br>5                          |
| 113        | 683        | 0         | oc                 | p              | 6/25/29<br>6/25/29   | 24.2<br>23.8        | 34.6               | 8.25         | 5                               |
| 113        | 684<br>685 | 50<br>100 | r                  | p              | 6/25/29              | 21.5                | 34.7               | 8.23         | 8                               |
| 113<br>130 | 787        | 0         | c                  | p<br>n         | 9/ 4/29              | 16.2                | 33.4               | 8.34         | 36                              |
| 131        | 789        | 100       | r                  | n              | 9/ 6/29              | 12.1                | 33.4               | 8.32         | ***                             |
| 131        | 792        | 0         | oc                 | р              | 9/ 6/29              | 19.3                | 33.4               | 8.34         |                                 |
| 132        | 797        | 0         | oc                 | n              | 9/8/29               | 21.0                | 33.9               | 8.34         | 15                              |
| 132        | 798        | 50        | oc                 | n              | 9/ 8/29              | 17.6                | 33.9               | 8.33         | 19                              |
| 132        | 799        | 100       | oc                 | n              | 9/ 8/29              | 14.3                | 33.4               | 8.30         | 16                              |
| 132        | 801        | 0         | r                  | p              | 9/ 8/29              | 21.0                | 33.9<br>33.9       | 8.34<br>8.33 | 15<br>19                        |
| 132        | 802        | 50        | r                  | p              | 9/ 8/29<br>9/10/29   | 17.6<br>22.7        | 34.7               | 8.47         | 7                               |
| 133        | 804<br>805 | 0<br>50   | r                  | n<br>n         | 9/10/29              | 20.8                | 34.7               | 8.37         | 7                               |
| 133<br>133 | 806        | 100       | oc<br>oc           | n              | 9/10/29              | 18.4                | 34.8               | 8.31         | ż                               |
| 133        | 808        | 0         | oc                 | n              | 9/10/29              | 22.7                | 34.7               | 8.47         | 7                               |
| 133        | 809        | 50        | oc                 | n              | 9/10/29              | 20.8                | 34.7               | 8.37         | 7<br>7<br>7                     |
| 134        | 810        | 100       | oc                 | n              | 9/10/29              | 18.4                | 34.8               | 8.31         | 7                               |
| 134        | 813        | 50        | r                  | p              | 9/12/29              | 19.8                | 34.6               | 8.34         | 6                               |
| 134        | 815        | 0         | $\mathbf{r}$       | p              | 9/12/29              | 22.9                | 34.7               | 8.34         | 6                               |
| 134        | 817        | 100       | r                  | p              | 9/12/29              | 18.1                | 34.6               | 8.34         | 6<br>5<br>5<br>7                |
| 135        | 821        | 50        | c                  | n              | 9/14/29              | 21.5                | 35.0               | 8.37         | 5                               |
| 135        | 822        | 100       | oc                 | n              | 9/14/29              | 18.7                | 34.8<br>35.1       | 8.34<br>8.37 | 7                               |
| 135        | 824        | 0         | r                  | p              | 9/14/29              | 23.8<br>21.5        | 35.0               | 8.37         | 5                               |
| 135        | 825        | 50<br>0   | r                  | p              | 9/14/29<br>9/16/29   | 24.6                | 35.4               | 8.37         | 5 3 3 3 3 4 5                   |
| 136        | 827<br>828 | 50        | r<br>c             | n<br>n         | 9/16/29              | 21.4                | 35.1               | 8.39         | 3                               |
| 136<br>136 | 829        | 100       | c                  | n              | 9/16/29              | 18.6                | 35.0               | 8.39         | 3                               |
| 136        | 833        | 50        | r                  | p              | 9/16/29              | 21.4                | 35.1               | 8.39         | 3                               |
| 136        | 834        | 100       | r                  | p              | 9/16/29              | 18.6                | 35.0               | 8.39         | 3                               |
| 137        | 836        | 0         | c                  | 'n             | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                               |
| 137        | 838        | 100       | c                  | n              | 9/18/29              | 21.5                | 35.1               | 8.30         | 5                               |
| 137        | 840        | 0         | r                  | p              | 9/18/29              | 25.5                | 35.0               | 8.39         | 4                               |
| 137        | 841        | 50        | r                  | p              | 9/18/29              | 24.4                | 35.1               | 8.34         | 4<br>4<br>5<br>3<br>5           |
| 138        | 843        | 0         | oc                 | n              | 9/20/29              | 26.1                | 34.8               | 8.35         | 2                               |
| 138        | 844        | 50        | r                  | n              | 9/20/29              | 25.6<br>26.1        | 34.7<br>34.8       | 8.30<br>8.35 | 5                               |
| 138        | 847        | 0         | r                  | p              | 9/20/29<br>9/22/29   | 26.7                | 34.8               | 8.34         | 6                               |
| 139<br>139 | 849<br>850 | 0<br>50   | r<br>c             | n<br>n         | 9/22/29              | 25.8                | 34.9               | 8.31         | 6                               |
| 139        | 851        | 100       | oc                 | n              | 9/22/29              | 22.4                | 35.2               | 8.28         | 6                               |
| 139        | 853        | 0         | r                  | p              | 9/22/29              | 26.7                | 34.8               | 8.34         | 6                               |
| 140        | 856        | Ö         | c                  | 'n             | 10/ 3/29             | 26.9                | 35.0               | 8.42         | 7                               |
| 140        | 857        | 50        | 00                 | n              | 10/ 3/29             | 26.9                | 35.0               | 8.39         | 7                               |
| 140        | 858        | 100       | c                  | n              | 10/ 3/29             | 25.5                | 35.0               | 8.34         | 7                               |
| 141        | 864        | 0         | c                  | n              | 10/ 5/29             | 25.9                | 35.2               | 8.34         | 5<br>5<br>5                     |
| 141        | 865        | 50        | С                  | n              | 10/ 5/29             | 24.8                | 35.3<br>35.2       | 8.34<br>8.34 | 5                               |
| 141        | 868        | 0         | r                  | p              | 10/ 5/29             | 25.9                | 34.8               | 8.33         | 5                               |
| 142        | 872        | 0         | oc                 | n              | 10/ 7/29<br>10/ 7/29 | 24.1<br>21.8        | 34.8               | 8.30         | 5                               |
| 142<br>142 | 873<br>874 | 50<br>100 | c<br>c             | n<br>n         | 10/ 7/29             | 16.6                | 34.4               | 8.27         | 7                               |
| 142        | 876        | 0         | r                  | p              | 10/ 7/29             | 24.1                | 34.8               | 8.33         | 5                               |
| 142        | 878        | 100       | r                  | p              | 10/ 7/29             | 16.6                | 34.4               | 8.27         | 7                               |
| 142        | 881        | 0         | c                  | n              | 10/ 7/29             | 24.1                | 34.8               | 8.33         | 5                               |
| 143        | 882        | 50        | c                  | n              | 10/ 9/29             | 19.0                | 34.2               | 8.34         | 6                               |
| 143        | 884        | 0         | oc                 | p              | 10/ 9/29             | 22.4                | 34.4               | 8.30         | 6                               |
| 143        | 885        | 50        | r                  | p              | 10/ 9/29             | 19.0                | 34.2               | 8.34<br>8.37 | 6                               |
| 144        | 886        | 0         | r                  | n              | 10/11/29             | 23.3<br>23.3        | 35.0<br>35.0       | 8.37         | 6                               |
| 144        | 887        | 0         | r                  | p<br>n         | 10/11/29<br>10/11/29 | 21.1                | 34.7               | 8.33         | 6                               |
| 144        | 888<br>889 | 50<br>100 | r                  | p              | 10/11/29             | 16.6                | 34.5               | 8.37         | 6                               |
| 144<br>145 | 890        | 0         | c                  | n              | 10/13/29             | 22.3                | 34.6               | 8.29         | 6                               |
| 145        | 891        | 50        | c                  | n              | 10/13/29             | 18.7                | 34.3               | 8.34         | 6                               |
| 145        | 892        | 100       | oc                 | n              | 10/13/29             | 16.0                | 34.1               | 8.31         | 6                               |
| 145        | 893        | 0         | oc                 | p              | 10/13/29             | 22.3                | 34.6               | 8.29         | 6                               |
| 145        | 894        | 50        | r                  | p              | 10/13/29             | 18.7                | 34.3               | 8.34         | 6                               |
| 146        | 896        | 0         | oc                 | n              | 10/15/29             | 22.4                | 34.9               | 8.37         | 6                               |
| 146        | 897        | 50        | oc                 | n              | 10/15/29             | 22.4                | 34.9               | 8.30         | 6                               |
| 146        | 898        | 100       | oc                 | n              | 10/15/29             | 19.7                | 34.3               | 8.26<br>8.26 | 7 8                             |
| 147        | 903        | 0         | oc                 | n              | 10/17/29             | 23.3                | 35.3<br>35.3       | 8.26         | 5                               |
|            | 004        | 50        | oc                 | n              | 10/17/29             | 23.1                | 33.3               |              | 0                               |
| 147<br>147 | 904<br>905 | 100       | oc                 | n              | 10/17/29             | 19.2                | 35.0               | 8.29         | 5                               |

Table 37. Distributional and environmental records for Ceratium contortum--Concluded

| Station    | Sample     | Depth | Relative  | Appa-  | Date                 | Temperature  | Salinity     | рН           | PO <sub>4</sub>   |
|------------|------------|-------|-----------|--------|----------------------|--------------|--------------|--------------|-------------------|
|            |            | (m)   | abundance | ratus  | Date                 | (°C)         | (0/00)       | pii          | mg/m <sup>3</sup> |
|            |            |       |           |        |                      |              |              | -            |                   |
| 148        | 910        | 0     | oc        | n      | 10/19/29             | 23.4         | 35.2         |              | • • •             |
| 148        | 912        | 100   | r         | n      | 10/19/29             | 20.0         | 35.0         | ****         | ***               |
| 149        | 920        | 0     | r         | n      | 10/19/29             | 23.5         | 35.0         | 8.34         | 6                 |
| 149        | 921        | 50    | ос        | n      | 10/21/29             | 23.3         | 35.0         | 8.37         | 6                 |
| 149        | 922        | 100   | ос        | n      | 10/21/29             | 20.3         | 34.9         | 8.38         | 6                 |
| 149        | 927        | 0     | r         | р      | 10/21/29             | 23.5         | 35.0         | 8.34         | 6                 |
| 150        | 929        | 0     | C         | n      | 10/23/29             | 25.6         | 34.7         | 8.39         | 7                 |
| 150        | 930        | 50    | oc        | n      | 10/23/29             | 22.8         | 34.8         | 8.35         | 10                |
| 150        | 931        | 100   | ос        | n      | 10/23/29             | 19.6         | 34.6         | 8.32         | 11                |
| 150        | 933        | 0     | r         | p      | 10/23/29             | <b>25</b> .6 | 34.7         | 8.39         | 7                 |
| 151        | 937        | 0     | c         | n      | 10/26/29             | 26.0         | 34.0         |              | ***               |
| 151        | 939        | 100   | oc        | n      | 10/26/29             | 12.5         | 34.6         | ****         | ***               |
| 151        | 941        | 0     | r         | p      | 10/26/29             | 26.0         | 34.0         | *****        | • • •             |
| 151        | 942        | 50    | r         | p      | 10/26/29             | 18.3         | 34.4         |              | ***               |
| 151        | 943        | 100   | oc        | n      | 10/26/29             | 12.5         | 34.6         |              |                   |
| 152        | 944        | 0     | oc        | n      | 10/27/29             | 27.4         | 33.7         | 8.35         | 20                |
| 152        | 945        | 50    | oc        | n      | 10/27/29             | 14.2         | 34.5         | 7.87         | 53                |
| 152        | 946        | 100   | oc        | n      | 10/27/29             | 11.4         | 34.7         | 7.76         | 75                |
| 152        | 948        | 50    | ос        | n      | 10/27/29             | 14.2         | 34.5         | 7.87         | 53                |
| 152        | 949        | 50    | oc        | p      | 10/27/29             | 14.2         | 34.5         | 7.87         | 53                |
| 153        | 951        | 0     | oc        | n      | 10/29/29             | 28.1         | 34.2         | 8.47         | 7                 |
| 153        | 952        | 50    | С         | n      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                 |
| 153        | 953        | 100   | oc        | n      | 10/29/29             | 20.5         | 34.7         | 8.28         | 31                |
| 153        | 955        | 0     | r         | p      | 10/29/29             | 28.1         | 34.2         | 8.47         | 7                 |
| 153        | 956        | 50    | r         | p      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                 |
| 154        | 958        | 0     | С         | n      | 10/31/29             | 28.3         | 34.2         | 8.39         | 7                 |
| 154        | 959        | 50    | oc        | n      | 10/31/29             | 28.2         | 34.2         | 8.40         | 7                 |
| 154        | 960        | 100   | r         | n      | 10/31/29             | 25.3         | 34.8         | 7.93         | 21                |
| 155        | 965        | 0     | С         | n      | 11/ 2/29             | 27.8         | 34.9         | 8.29         | 29                |
| 155        | 966        | 50    | С         | n      | 11/ 2/29             | 27.7         | 34.9         | 8.30         | 30                |
| 155        | 967        | 100   | oc        | n      | 11/ 2/29             | 27.2         | 35.0         | 8.30         | 35                |
| 156        | 972        | 100   | oc        | n      | 11/ 4/29             | 27.6         | 35.0         | 8.34         | 28                |
| 156        | 974        | 100   | oc        | n      | 11/ 4/29             | 26.4         | 35.1         | 8.30         | 48                |
| 157        | 978        | 0     | c         | n      | 11/6/29              | 27.1         | 35.3         | 8.27         | 47                |
| 157        | 979        | 50    | С         | n      | 11/ 6/29             | 27.1         | 35.2         | 8.32         | 60                |
| 157        | 980        | 100   | oc        | n      | 11/ 6/29             | 26.8         | 35.5<br>35.6 | 8.30<br>8.34 | 64                |
| 158<br>158 | 983<br>984 | 50    | c         | n      | 11/ 8/29<br>11/ 8/29 | 28.2<br>28.2 | 35.6         | 8.39         | 36<br>50          |
| 158        | 985        | 100   | c         | n      | 11/ 8/29             | 27.6         | 35.9         | 8.39         | 48                |
| 159        | 990        | 0     | c<br>c    | n      | 11/0/29              | 28.6         | 35.7         | 8.37         | 15                |
| 159        | 991        | 50    | oc        | n      | 11/11/29             | 28.5         | 35.7         | 8.39         | 15                |
| 159        | 992        | 100   | r         | n      | 11/11/29             | 28.0         | 35.7         | 8.37         | 23                |
| 160        | 1000       | 0     | r         | n<br>n | 11/11/29             | 28.6         | 35.6         | 8.37         | 12                |
| 160        | 1002       | 50    | oc        |        | 11/13/29             | 28.6         | 35.6         | 8.39         | 15                |
| 160        | 1002       | 100   | r         | n<br>n | 11/13/29             | 28.5         | 35.7         | 8.44         | 16                |
| 100        | 1000       | 100   | 1         | - 11   | 11/10/29             | 20.0         | 39.1         | 0.44         | 10                |

Table 38. Distributional and environmental records for Ceratium limulus Gourret

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub> mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|-----------------------------------|
|         |        |           |                    |                |          |                     |                    |      |                                   |
| 15      | 98     | 50        | r                  | p              | 8/11/28  | 19.8                | 36.5               | 8.21 | 8                                 |
| 16      | 103    | 0         | r                  | p              | 8/13/28  | 25.9                | 36.2               | 8.24 | 8<br>8<br>9                       |
| 17      | 109    | 0         | r                  | p              | 8/15/28  | 26.2                | 36.6               | 8.29 |                                   |
| 17      | 112    | 50        | r                  | ñ              | 8/15/28  | 21.9                | 36.6               | 8.28 | 12                                |
| 17      | 113    | 100       | r                  | n              | 8/15/28  | 19.3                | 36.5               | 8.23 |                                   |
| 18      | 115    | 50        | r                  | p              | 8/17/28  | 22.4                | 36.8               | 8.24 | 9<br>5<br>5                       |
| 18      | 118    | 50        | r                  | 'n             | 8/17/28  | 22.4                | 36.8               | 8.24 | 5                                 |
| 25      | 161    | 50        | r                  | n              | 9/ 3/28  | 21.5                | 36.0               | 8.22 | 12                                |
| 26      | 165    | 100       | r                  | p              | 9/ 5/28  | 14.9                | 36.6               | 8.11 | 40                                |
| 27      | 171    | 50        | r                  | 'n             | 9/ 7/28  | 26.0                | 36.2               | 8.30 | 4                                 |
| 29      | 179    | 0         | r                  | p              | 9/13/28  | 27.6                | 36.2               | 8.31 | 3                                 |
| 29      | 181    | 100       | r                  | p              | 9/13/28  | 23.1                | 36.6               | 8.21 | 3<br>8<br>3                       |
| 30      | 186    | 50        | r                  | ัก             | 9/15/28  | 27.8                | 36.1               | 8.29 | 3                                 |
| 41a     | 240    | 0         | r                  | p<br>n         | 11/12/28 | (18.7               | 34.7               | 8.06 | 45)                               |
| 42      | 241    | 0         | r                  | n              | 11/13/28 | 18.7                | 34.7               | 8.06 | 45                                |
| 42      | 243    | 100       | r                  | n              | 11/13/28 | 13.8                | 35.0               | 7.91 | 150                               |
| 43      | 247    | 0         | r                  | p              | 11/15/28 | 19.6                | 34.8               | 8.09 | 52                                |
| 44      | 253    | ŏ         | r                  | p              | 11/17/28 | 20.7                | 34.9               | 8.03 | 38                                |
| 45      | 258    | 100       | r                  | n              | 11/29/28 | 18.6                | 35.1               | 8.00 | 50                                |
| 45      | 259    | 0         | r                  | p              | 11/19/28 | 22.4                | 35.3               | 8.12 | 38                                |
| 45      | 260    | 50        | r                  | p              | 11/19/28 | 22.4                | 35.2               | 8.13 | 46                                |
| 46      | 265    | 50        | r                  | p              | 11/21/28 | 23.2                | 35.3               | 8.16 | 40                                |

Table 38. Distributional and environmental records for Ceratium limulus Gourret--Concluded

| Station        | Sample                       | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m <sup>3</sup>                             |
|----------------|------------------------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--|
| 47             | 269                          | 0         | r                  | Ď.             | 11/23/28<br>11/29/28 | 23.9<br>23.2        | 36.0<br>36.0       | 8.23<br>8.23 | 17<br>13   |
| 50<br>50       | 287<br>288                   | 50        | oc                 | p<br>p         | 11/29/28             | 22.0                | 35.9               | 8.23         | 13   |
| 50             | 289                          | 100       | r                  | p              | 11/29/28             | 20.5                | 35.7<br>35.6       | 8.22<br>8.22 | 13<br>16)  |
| 50-51<br>50-51 | 290<br>291                   | 0         | r                  | n<br>n         | 11/30/28<br>11/30/28 | (22.8<br>(22.8      | 35.6               | 8,22         | 16)  |
| 50-51          | 292                          | ŏ         | r                  | n              | 11/30/28             | (22.8               | 35.6               | 8.22         | 16)  |
| 51             | 294                          | 50        | r                  | n              | 12/ 1/28<br>12/ 1/28 | 20.5<br>22.8        | 35.6<br>35.6       | 8.22<br>8.22 | 17<br>16   |
| 51<br>51       | 296<br>298                   | 0<br>100  | r                  | p<br>p         | 12/ 1/28             | 20.0                | 35.6               | 8.22         | 17   |
| 52             | 300                          | 50        | r                  | n              | 12/ 3/28             | 20.2<br>22.5        | 35.6<br>35.4       | 8.20<br>8.21 | 8  |
| 52<br>53       | 302<br>306                   | 0         | 00                 | p<br>p         | 12/ 3/28<br>12/ 5/28 | 22.6                | 35.7               | 8.22         | 13   |
| 53-54          | 310                          | 0         | r                  | n              | 12/10/28             | (23.0               | 35.6               | 8.22         | 11)  |
| 53-54          | 311                          | 0         | r                  | n              | 12/10/28<br>12/14/28 | (23.0<br>23.4       | 35.6<br>35.5       | 8.22<br>8.22 | 11)<br>9   |
| 54<br>55       | 322<br>324                   | 50        | r                  | p<br>n         | 12/16/28             | 18.7                | 35.0               | 8.18         | 12   |
| 56             | 330                          | 100       | r                  | n              | 12/18/28             | 16.6                | 34.3<br>34.3       | 8.11<br>8.14 | 12<br>21   |
| 57<br>58       | 336<br>342                   | 50<br>50  | r                  | n<br>n         | 12/20/28<br>12/22/28 | 15.6<br>14.8        | 34.0               | 8.12         | 25   |
| 62-63          | 377                          | 0         | r                  | n              | 12/31/28             | (20.5               | 34.6               | 8.07         | 21)  |
| 62-63          | 378                          | 0         | r                  | n              | 12/31/28 1/ 1/29     | (20.5<br>(20.5      | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)   |
| 63-64<br>63-64 | 385<br>387                   | 0         | r                  | n              | 1/ 2/29              | (20.5               | 34.6               | 8.07         | 21)  |
| 63-64          | 388                          | 0         | r                  | n              | 1/ 2/29              | (20.5<br>(20.5      | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)   |
| 63-64<br>63-64 | 391<br>393                   | 0         | r                  | n<br>n         | 1/ 2/29<br>1/ 1/29   | (20.5               | 34.6               | 8.07         | 21)  |
| 64-65          | 402                          | 0         | r                  | n              | 1/4/29               | (20.6               | 34.6               | 8.12         | 21)  |
| 64-65          | 403                          | 0<br>50   | r                  | n              | 1/ 4/29<br>1/ 5/29   | (20.6<br>16.5       | 34.6<br>34.5       | 8.12<br>8.10 | 21)<br>25  |
| 65<br>65       | 209<br>410                   | 100       | r                  | p<br>p         | 1/ 5/29              | 14.8                | 34.3               | 8.10         | 34   |
| 66             | 415                          | 100       | r                  | p              | 1/ 7/29<br>2/10/29   | 17.8<br>14.7        | 34.9<br>35.0       | 8.12<br>7.80 | 21<br>178  |
| 73<br>77       | 452<br>474                   | 100<br>50 | r                  | n<br>p         | 2/18/29              | 23.5                | 36.0               | 8.19         | 16   |
| 96             | 573                          | 100       | r                  | p              | 4/26/29              | 28.2                | 35.7<br>35.4       | 8.19<br>8.16 | 25<br>21   |
| 97<br>97       | 575<br>578                   | 50<br>50  | r                  | n<br>p         | 4/28/29<br>4/28/29   | 28.0<br>28.0        | 35.4               | 8.16         | 21   |
| 98             | 585                          | 50        | r                  | p              | 4/30/29              | 26.9                | 35.3               | 8.16         | 28   |
| 100            | 596                          | 50<br>100 | r                  | n<br>n         | 5/ 4/29<br>5/ 4/29   | 27.6<br>27.6        | 34.7<br>34.7       | 8.21<br>8.22 | 10<br>12   |
| 100<br>101     | 597<br>604                   | 50        | r                  | n              | 5/ 7/29              | 26.2                | 34.7               | 8.24         | 8  |
| 101            | 605                          | 100       | r                  | n              | 5/ 7/29<br>5/ 9/29   | 25.2<br>25.8        | 35.1<br>35.0       | 8.23<br>8.24 | 8  |
| 102<br>102     | 610<br>611                   | 50<br>100 | r                  | n<br>n         | 5/ 9/29              | 25.6                | 35.0               | 8.23         | 8  |
| 102            | 612                          | 0         | r                  | p              | 5/ 9/29              | 25.8                | 35.0<br>35.2       | 8.24<br>8.25 | 8<br>5   |
| 103<br>106     | 616<br>634                   | 50<br>50  | r                  | n<br>n         | 5/11/29<br>5/17/29   | 25.8<br>27.0        | 35.0               | 8.23         | 5  |
| 107            | 639                          | 0         | r                  | n              | 5/19/29              | 28.0                | 34.4               | 8.23<br>8.23 | 12<br>8<br>8<br>8<br>8<br>8<br>5<br>5<br>5<br>4<br>5 |
| 107            | 640                          | 50<br>0   | r                  | n<br>p         | 5/19/29<br>5/19/29   | 27.9<br>28.0        | 34.4               | 8.23         | 5  |
| 107<br>107     | 642<br>645                   | 50        | r                  | p              | 5/19/29              | 27.9                | 34.4               | 8.23         | 4  |
| 132            | 797                          | 0         | r                  | n              | 9/ 8/29<br>9/ 8/29   | 21.0<br>21.0        | 33.9<br>33.9       | 8.34<br>8.34 | 15<br>15   |
| 132<br>133     | 801<br>812                   | 0         | r                  | p<br>p         | 9/10/29              | 22.7                | 34.7               | 8.47         | 7  |
| 138            | 847                          | 0         | r                  | p              | 9/20/29              | 26.1                | 34.8<br>35.0       | 8.35<br>8.34 | 7<br>5<br>7  |
| 140<br>141     | 8 <b>5</b> 8<br>8 <b>6</b> 8 | 100       | r                  | n<br>p         | 10/ 3/29<br>10/ 5/29 | 25.9                | 35.2               | 8.34         | 5<br>6   |
| 144            | 886                          | 0         | r                  | n              | 10/11/29             | 23.3                | 35.0<br>35.3       | 8.37<br>8.26 | 6<br>8   |
| 147            | 907                          | 0         | r                  | p<br>p         | 10/17/29 10/19/29    | 23.3<br>23.4        | 35.2               | 0.20         | ***  |
| 148<br>149     | 917<br>928                   | 50        | r                  | þ              | 10/21/29             | 23.3                | 35.0               | 8.37         | 6  |
| 157            | 978                          | 0         | r                  | n,             | 11/ 6/29             | 27.1<br>28.2        | 35.3<br>35.6       | 8.27<br>8.34 | 47<br>36   |
| 158<br>158     | 983<br>984                   | 0<br>50   | r                  | n<br>n         | 11/ 8/29<br>11/ 8/29 | 28.2                | 35.6               | 8.39         | 50   |
| 158            | 985                          | 100       | r                  | n              | 11/ 8/29             | 27.6                | 35.9<br>35.7       | 8.39<br>8.37 | 48<br>23   |
| 159            | 992                          | 100       | r                  | n              | 11/11/29             | 28.0                | 30.1               | 0.01         | 20   |

Table 39. Distributional and environmental records for Ceratium paradoxides Cleve

|             |                    | D41        |                    |                |                      | Tor Ceratium        |                    |                               |                                      |
|-------------|--------------------|------------|--------------------|----------------|----------------------|---------------------|--------------------|-------------------------------|--------------------------------------|
| Station     | Sample             | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН                            | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 1b          | 7                  | 50         |                    | -              | E/16/20              | (22.2               | 36.4               | 0.91                          |                                      |
| 2           | 14                 | 0          | r                  | n<br>n         | 5/16/28<br>5/18/28   | (22.2<br>20.5       | 36.4               | 8.21<br>8.23                  | 39)<br>58                            |
| 15          | 98                 | 50         | r                  | p              | 8/11/28              | 19.8                | 36.5               | 8.21                          | 8                                    |
| 15          | 101                | 50         | r                  | n              | 8/11/28              | 19.8                | 36.5               | 8.21                          | 8                                    |
| 15          | 102                | 100        | r                  | n              | 8/11/28              | 18.4                | 36.4               | 8.20                          | 19                                   |
| 18<br>18    | 115<br>116         | 50<br>100  | . r<br>oc          | p              | 8/17/28<br>8/17/28   | 22.4<br>20.4        | 36.8<br>36.8       | 8.24<br>8.21                  | 5                                    |
| 18          | 119                | 100        | r                  | p<br>n         | 8/17/28              | 20.4                | 36.8               | 8.21                          | 5<br>5<br>5                          |
| 19          | 124                | 100        | r                  | n              | 8/20/28              | 22.4                | 37.0               | 8.25                          | 5                                    |
| 20          | 127                | 100        | r                  | p              | 8/22/28              | 22.6                | 36.7               | 8.19                          | 5                                    |
| 20          | 130                | 100        | r                  | n              | 8/22/28              | 22.6                | 36.7               | 8.19                          | 5                                    |
| 20-21<br>21 | 131<br>137         | 0<br>100   | r                  | n<br>n         | 8/23/28<br>8/24/28   | (26.6<br>21.0       | 36.3<br>36.8       | 8. <b>32</b><br>8. <b>2</b> 0 | 4)                                   |
| 22          | 140                | 50         | r                  | p              | 8/27/28              | 24.5                | 36.2               | 8.21                          | 9                                    |
| 22          | 143                | 50         | r                  | n              | 8/27/28              | 24.5                | 36.2               | 8.21                          | 9                                    |
| 22          | 144                | 100        | r                  | n              | 8/27/28              | 17.5                | 36.1               | 7.99                          | 123                                  |
| 23<br>25    | 149                | 50         | r                  | n              | 8/29/28              | 20.9                | 36.0               | 8.14                          | 13                                   |
| 25          | 158<br>161         | 50<br>50   | r                  | p<br>n         | 9/ 3/28<br>9/ 3/28   | 21.5<br>21.5        | 36.0<br>36.0       | 8.22<br>8.22                  | 12<br>12                             |
| 25          | 162                | 100        | r                  | n              | 9/ 3/28              | 14.6                | 35.7               | 7.93                          | 121                                  |
| 26          | 164                | 50         | r                  | p              | 9/ 5/29              | 24.1                | 36.1               | 8.21                          | 5                                    |
| 28          | 177                | 50         | r                  | n              | 9/11/28              | 26.7                | 36.3               | 8.26                          | 4                                    |
| 35<br>42    | 204<br>242         | 50         | r                  | n              | 10/26/28             | 16.8                | 34.7               | 7.92                          | 138                                  |
| 42          | 242                | 50<br>50   | r                  | n<br>n         | 11/13/28<br>11/15/28 | 17.2<br>17.0        | 34.9<br>34.9       | 7.99                          | 68<br>80                             |
| 43          | 249                | 100        | r                  | p              | 11/15/28             | 13.6                | 35.0               | 7.90                          | 92                                   |
| 44          | 251                | 50         | r                  | n              | 11/17/28             | 20.4                | 34.9               | 8.04                          | 34                                   |
| 44          | 255                | 100        | r                  | p              | 11/17/28             | 13.8                | 35.0               | 7.85                          | 70                                   |
| 45          | 257                | 50         | r                  | n              | 11/19/28             | 22.4                | 35.2               | 8.13                          | 46                                   |
| 45<br>46    | 258<br>263         | 100<br>100 | oc                 | n              | 11/19/28<br>11/21/28 | 18.6<br>22.5        | 35.1<br>35.4       | 8.00<br>8.17                  | 50<br>40                             |
| 47          | 268                | 100        | r                  | n<br>n         | 11/23/28             | 22.7                | 36.2               | 8.23                          | 20                                   |
| 50          | 286                | 100        | r                  | n              | 11/29/28             | 20.5                | 35.7               | 8.22                          | 13                                   |
| 50          | 287                | 0          | r                  | p              | 11/29/28             | 23.2                | 36.0               | 8.23                          | 13                                   |
| 52          | 301                | 100        | r                  |                | 12/ 3/28             | 18.2                | 35.2               | 8.17                          | 8                                    |
| 53 .<br>54  | 305<br>321         | 100<br>100 | r                  | n              | 12/ 5/28<br>12/14/28 | 19.9<br>18.7        | 35.6<br>35.4       | 8.19<br>8.16                  | 13<br>20                             |
| 55          | 324                | 50         | r                  | n<br>n         | 12/16/28             | 18.7                | 35.0               | 8.18                          | 12                                   |
| 55          | 325                | 100        | r                  | n              | 12/16/28             | 16.7                | 34.9               | 7.17                          | 12                                   |
| 56          | 330                | 100        | OC                 | n              | 12/18/28             | 16.6                | 34.8               | 8.11                          | 12                                   |
| 56          | 333                | 100        | r                  | p              | 12/18/28             | 16.6                | 34.8               | 8.11                          | 12                                   |
| 56-57<br>57 | 334<br>337         | 0<br>100   | oc<br>r            | n<br>n         | 12/19/28<br>12/20/28 | (19.0<br>14.3       | 34.5<br>34.4       | 8.14<br>8.10                  | 20)<br>40                            |
| 57          | 338                | 0          | r                  |                | 12/20/28             | 19.0                | 34.5               | 8.14                          | 20                                   |
| 57          | 340                | 100        | r                  | p              | 12/20/28             | 14.3                | 34.4               | 8.10                          | 40                                   |
| 62          | 372                | 50         | r                  | n              | 12/30/28             | 16.2                | 34.3               | 8.10                          | 28                                   |
| 66          | 412                | 100        | oc                 | n              | 1/ 7/29              | 17.8                | 34.9               | 8.12                          | 21                                   |
| 66<br>67    | 415<br>416         | 100        | r                  | p<br>n         | 1/ 7/29<br>1/ 8/29   | 17.8<br>19.3        | 34.9<br>34.9       | 8.12<br>8.11                  | 21<br>21                             |
| 67          | 418                | 100        | oc                 | n              | 1/ 8/29              | 16.2                | 34.6               | 8.05                          | 40                                   |
| 80          | 490                | 100        | r                  | p              | 2/24/29              | 23.4                | 36.2               | 8.16                          | 32                                   |
| 82          | 500                | 100        | r                  | p              | 2/28/29              | 24.4                | 36.5               | 8.19                          | 34                                   |
| 85<br>91    | 514<br>544         | 100<br>100 | r                  | p              | 3/ 6/29<br>3/27/29   | 25.2<br>25.8        | 36.3<br>36.0       | 8.23<br>8.25                  | 42<br>30                             |
| 94          | 559                | 100        | r                  | p<br>n         | 4/22/29              | 28.5                | 35.6               | 8.21                          | 25                                   |
| 95          | 563                | 50         | r                  | n              | 4/22/29<br>4/24/29   | 29.3                | 34.9               | 8.24                          | 16                                   |
| 95          | 564                | 100        | r                  | n              | 4/24/29              | 28.5                | 35.4               | 8.22                          | 21                                   |
| 96          | 570                | 100        | ос                 | n              | 4/26/29              | 28.2                | 35.7               | 8.19                          | 25                                   |
| 96          | 573                | 100        | oc                 | p              | 4/26/29              | 28.2                | 35.7               | 8.19                          | 25<br>25                             |
| 97<br>100   | 576<br><b>5</b> 97 | 100<br>100 | r                  | n<br>n         | 4/28/29<br>5/ 4/29   | 27.6<br>27.6        | 35.6<br>34.7       | 8.15<br>8.22                  | 12                                   |
| 101         | 605                | 100        | r                  | n              | 5/ 7/29              | 25.2                | 35.1               | 8.23                          | 8                                    |
| 102         | 611                | 100        | r                  | n              | 5/ 9/29              | 25.6                | 35.0               | 8.23                          | 8                                    |
| 103         | 617                | 100        | r                  | n              | 5/11/29              | 24.8                | 35.2               | 8.25                          | 8<br>5<br>5<br>5                     |
| 105         | 629                | 100        | r                  | n              | 5/15/29              | 25.2                | 35.1               | 8.23                          | 5                                    |
| 106<br>107  | 635<br>641         | 100<br>100 | r                  | n<br>n         | 5/17/29<br>5/19/29   | 25.6<br>26.8        | 35.1<br>34.9       | 8.23<br>8.23                  | 11                                   |
| 109         | 656                | 100        | oc                 | n              | 5/29/29              | 19.4                | 34.8               | 8.18                          | 5                                    |
| 109         | 659                | 100        | r                  | p              | 5/29/29              | 19.4                | 34.8               | 8.18                          | 5<br>5                               |
| 110         | 663                | 100        | r                  | n              | 5/31/29              | 17.9                | 34.7               | 8.14                          | 11                                   |
| 112         | 675                | 50         | oc                 | n              | 6/ 5/29              | 21.7                | 34.6               | 8.23                          | 7                                    |
| 113         | 681                | 50         | r                  | n              | 6/25/29              | 23.8                | 34.6               | 8.25                          | 5<br>5                               |
| 113<br>113  | 684<br>684         | 50         | r                  | p              | 6/25/29<br>6/25/29   | 23.8<br>21.5        | 34.6<br>34.7       | 8.25<br>8.23                  | 8                                    |
| 131         | 789                | 100<br>100 | r                  | p<br>n         | 9/ 6/29              | 12.1                | 33.4               | 8.32                          | •••                                  |
| 132         | 798                | 50         | r                  | п              | 9/ 8/29              | 17.6                | 33.9               | 8.33                          | 19                                   |

Table 39. Distributional and environmental records for Ceratium paradoxides Cleve--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 132     | 799    | 100       | _                  | _              | 9/ 8/29  | 14.3                | 33.4               | 8.30 | 16                                   |
| 135     | 822    | 100       | r                  | n              | 9/14/29  | 18.7                | 34.8               | 8.34 | 16                                   |
| 136     | 834    | 100       | r                  | n              | 9/16/29  | 18.6                | 35.0               | 8.39 | 3                                    |
| 137     | 838    | 100       | r                  | p<br>n         | 9/18/29  | 21.5                | 35.1               | 8.30 | 5<br>3<br>5                          |
| 137     | 841    | 50        | r<br>n             |                | 9/18/29  | 24.4                | 35.1               | 8.34 | 4                                    |
| 145     | 891    | 50        | r                  | p<br>n         | 10/13/29 | 18.7                | 34.3               | 8.34 | 6                                    |
| 145     | 898    | 100       | r                  | n              | 10/15/29 | 19.7                | 34.3               | 8.26 | 7                                    |
| 147     | 905    | 100       | r                  | n              | 10/17/29 | 19.2                | 35.0               | 8.29 | 5                                    |
| 149     | 922    | 100       | r                  | n              | 10/21/29 | 20.3                | 34.9               | 8.38 | 6                                    |
| 151     | 939    | 100       | r                  | n              | 10/26/29 | 12.5                | 34.6               |      | _                                    |
| 152     | 945    | 50        | r                  | n              | 10/27/29 | 14.2                | 34.5               | 7.87 | 53                                   |
| 152     | 949    | 50        | r                  | p              | 10/27/29 | 14.2                | 34.5               | 7.87 | 53                                   |
| 154     | 960    | 100       | r                  | n<br>n         | 10/31/29 | 25.3                | 34.8               | 7.93 | 21                                   |
| 157     | 980    | 100       | r                  | n              | 11/ 6/29 | 26.8                | 35.5               | 8.30 | 64                                   |
| 158     | 985    | 100       | oc                 | n              | 11/ 8/29 | 27.6                | 35.9               | 8.39 | 48                                   |

Table 40. Distributional and environmental records for Ceratium platycorne

| Station    | Sample      | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|-------------|------------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| 11.        |             | 50         |                    |                | E /10 /00            | (00.0               | 00.4               | 0.01         |                                      |
| 1b<br>6b   | 7<br>46     | 50<br>0    | r                  | n              | 5/16/28              | (22.2               | 36.4               | 8.21         | 39)                                  |
| 14         | 91          | 100        | r                  | n              | 6/ 2/28<br>8/ 9/28   | (12.4<br>14.0       | 35.6<br>35.6       | 8.15<br>8.06 | 21)<br>34                            |
| 14         | 92          | 50         | r                  | n              | 8/ 9/28              | 15.0                | 35.1               | 8.18         | 16                                   |
| 14         | 95          | 50         | oc                 | p<br>n         | 8/ 9/28              | 15.0                | 35.1               | 8.18         | 16                                   |
| 15         | 102         | 100        | r                  | n              | 8/11/28              | 18.4                | 36.4               | 8.20         | 19                                   |
| 16         | 105         | 100        | r                  | p              | 8/13/28              | 19.9                | 36.5               | 8.17         | 13                                   |
| 16         | 108         | 100        | oc                 | n              | 8/13/28              | 19.9                | 36.5               | 8.17         | 13                                   |
| 17         | 113         | 100        | r                  | n              | 8/15/28              | 19.3                | 36.5               | 8.23         | 13<br>13<br>9<br>5                   |
| 18         | 118         | 50         | r                  | n              | 8/17/28              | 22.4                | 36.8               | 8.24         | 5                                    |
| 19         | 124         | 100        | r                  | n              | 8/20/28              | 22.4                | 37.0               | 8.25         | 5                                    |
| 20         | 130         | 100        | r                  | n              | 8/22/28              | 22.6                | 36.7               | 8.19         | 5<br>123                             |
| 22         | 144         | 100        | ос                 | n              | 8/27/28              | 17.5                | 36.1               | 7.99         | 123                                  |
| 23         | 150         | 100        | r                  | n              | 8/29/28              | 16.6                | 36.0               | 8.18         | 75                                   |
| 24<br>25   | 156<br>158  | 100<br>50  | r                  | n              | 8/31/28<br>9/ 3/28   | 15.6<br>21.5        | 35.6<br>36.0       | 7.96<br>8.22 | 99<br><b>12</b>                      |
| 25         | 161         | 50         | r'<br>r            | p<br>n         | 9/ 3/28              | 21.5                | 36.0               | 8.22         | 12                                   |
| 27         | 171         | 50         | r                  | n              | 9/ 7/28              | 26.0                | 36.2               | 8.30         | 4                                    |
| 28         | 177         | 50         | oc                 | n              | 9/11/28              | 26.7                | 36.3               | 8.26         | 4                                    |
| 37         | 221         | 50         | r                  | p              | 11/ 1/28             | 18.8                | 34.5               | 8.00         | 121                                  |
| 41         | 239         | 100        | r                  | p              | 11/10/28             | 14.5                | 35.0               | 7.91         | 152                                  |
| 45         | 258         | 100        | r                  | 'n             | 11/19/28             | 18.6                | 35.1               | 8.00         | 50                                   |
| 46         | 263         | 100        | r                  | n              | 11/21/28             | 22.5                | 35.4               | 8.17         | 40                                   |
| 47         | <b>26</b> 8 | 100        | r                  | n              | 11/23/28             | 22.7                | 36.2               | 8.23         | 20                                   |
| 65         | 407         | 100        | οċ                 | n              | 1/ 5/29              | 14.8                | 34.3               | 8.10         | 34                                   |
| 65         | 410         | 100        | oc                 | p              | 1/ 5/29              | 14.8                | 34.3               | 8.10         | 34                                   |
| 67         | 418         | 100        | r                  | n              | 1/ 8/29              | 16.2                | 34.6               | 8:05         | 40                                   |
| 68<br>93   | 421<br>553  | 100<br>100 | r                  | n              | 1/10/29<br>3/31/29   | 16.5<br>27.6        | 34.8<br>35.8       | 8.13<br>8.27 | 34<br>29                             |
| 101        | 605         | 100        | r                  | p<br>n         | 5/ 7/29              | 25.2                | 35.1               | 8.23         | 8                                    |
| 102        | 611         | 100        | r                  | n              | 5/ 9/29              | 25.6                | 35.0               | 8.23         | 8                                    |
| 103        | 620         | 100        | r                  | p              | 5/11/29              | 24.8                | 35.2               | 8.25         | 5                                    |
| 104        | 626         | 100        | r                  | p              | 5/13/29              | 25.3                | 35.3               | 8.21         | 7<br>5                               |
| 106        | .635        | 100        | r                  | 'n             | 5/17/29              | 25.6                | 35.1               | 8.23         | 5                                    |
| 107        | 641         | 100        | r                  | n              | 5/19/29              | 26.8                | 34.9               | 8.23         | 11                                   |
| 107        | 644         | 100        | r                  | p              | 5/19/29              | 26.8                | 34.9               | 8.23         | 11                                   |
| 108        | 648         | 100        | oc                 | n              | 5/27/29              | 25.2                | 35.0               | 8.23         | 4                                    |
| 110        | 663         | 100        | r                  | n              | 5/31/29              | 17.9                | 34.7               | 8.14         | 11                                   |
| 110        | 666<br>670  | 100<br>100 | r                  | p              | 5/31/29<br>6/ 3/29   | 17.9<br>18.2        | 34.7<br>34.7       | 8.14<br>8.13 | 11<br>13                             |
| 111<br>113 | 681         | 50         | r                  | n<br>n         | 6/25/29              | 23.8                | 34.6               | 8.25         | 5                                    |
| 115        | 694         | 100        | r                  | n              | 6/29/29              | 15.6                | 34.6               | 8.08         | 27                                   |
| 115        | 698         | 100        | r                  | p              | 6/29/29              | 15.6                | 34.6               | 8.08         | 27                                   |
| 134        | 817         | 100        | r                  | p              | 9/12/29              | 18.1                | 34.6               | 8.34         | 6                                    |
| 135        | 826         | 100        | r                  | p ·            | 9/14/29              | 18.7                | 34.8               | 8.34         | 5                                    |
| 141        | 865         | 50         | r                  | 'n             | 10/ 5/29             | 24.8                | 35.3               | 8.34         | 5                                    |
| 142        | 874         | 100        | r                  | n              | 10/ 8/29             | 16.6                | 34.4               | 8.27         | 7                                    |
| 143        | 883         | 100        | С                  | n              | 10/ 9/29             | 13.8                | 34.1               | 8.30         | 10                                   |
| 145        | 892         | 100        | r                  | n              | 10/13/29             | 16.0                | 34.1               | 8.31         | 6                                    |
| 152        | 945         | 50         | r                  | n              | 10/27/29             | 14.2<br>14.2        | 34.5<br>34.5       | 7.87<br>7.87 | 53<br>53                             |
| 152<br>153 | 949<br>953  | 50<br>100  | r                  | p<br>n         | 10/27/29<br>10/29/29 | 20.5                | 34.7               | 8.28         | 31                                   |
| 153        | 985         | 100        | oc<br>r            | n ,            | 11/ 8/29             | 27.6                | 35.9               | 8.39         | 48                                   |
| 190        | 900         | 100        | E                  | 11             | 11/ 0/43             | 21.0                | 00.0               | 0.00         | 10                                   |

Table 41. Distributional and environmental records for Ceratium ranipes Cleve

| Station   Sample   Color   Section   Section   Sample   Color   Section      |         |        | Double    | Deletion           |                |          | us for ceration  |                    |      | - PO                                 |
|--|---------|--------|-----------|--------------------|----------------|----------|------------------|--------------------|------|--------------------------------------|
| 1  | Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature (°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 1b   | 1       | 1      | 0         | r                  | n              | 5/19/98  | 24.0             | 36.2               | 8 16 |                                      |
| 3  | 1b      | 7      | 50        |                    |                | 5/16/28  | (22.2            | 36.4               | 8.21 | 39)                                  |
| 15   | 1b      |        |           |                    |                | 5/16/28  |                  |                    | 8.18 |                                      |
| 15   | ა<br>15 |        |           |                    |                |          |                  |                    |      |                                      |
| 15   | 15      | 101    |           |                    |                |          |                  |                    | 8.21 |                                      |
| 16   | 15      |        |           |                    |                | 8/11/28  | 18.4             |                    |      |                                      |
| 18   |         |        |           |                    |                | 8/13/28  |                  |                    |      |                                      |
| 18   |         |        |           |                    |                | 8/13/28  |                  |                    |      |                                      |
| 20   | 18      | 119    | 100       |                    |                | 8/17/28  | 20.4             | 36.8               | 8.21 | 5                                    |
| 20   | 19      |        |           |                    |                | 8/20/28  |                  |                    |      | 5                                    |
| 21 137 100 r n 8/24/28 21.0 36.8 8.20 7 22 144 100 r n 8/24/28 17.5 36.1 7.99 123 23 145 0 r n 8/29/28 27.2 35.9 8.25 4 23 149 50 oc n 8/29/28 27.2 35.9 8.25 4 23 149 50 or n 8/29/28 20.9 36.0 8.14 13 24 152 50 r n 8/31/28 23.1 36.0 8.14 8 24 155 50 r n 8/31/28 23.1 36.0 8.14 8 25 157 0 r n 9/3/28 23.1 36.0 8.14 8 25 157 0 r n 9/3/28 21.5 36.0 8.14 8 25 157 0 r n 9/3/28 21.5 36.0 8.22 12 28 114 50   |         |        |           |                    |                |          |                  |                    |      | 5                                    |
| 23   | 21      | 137    | 100       |                    |                | 8/24/28  | 21.0             | 36.8               | 8.20 | 7                                    |
| 23 148 0 r n 8/29/28 27.2 35.9 8.25 4 24 152 50 r p 8/31/28 23.1 36.0 8.14 13 24 155 50 r n 8/31/28 23.1 36.0 8.14 8 25 157 0 r p 9/3/28 27.5 35.6 8.31 5 25 161 50 r n 9/3/28 21.5 36.0 8.22 12 27 172 100 oc n 9/7/28 11.7 38.0 8.09 46 28 174 50 r p 9/11/28 26.7 38.3 8.26 4 29 179 0 r p 9/11/28 27.8 36.1 8.29 3 30 188 50 r p 9/11/28 27.8 36.1 8.29 3 30 188 50 r p 9/15/28 27.8 36.1 8.29 3 30 189 50 r n 10/3/28 21.5 36.0 8.24 22 32 194 0 oc n 10/3/28 22.5 36.1 8.29 3 32 194 0 r n 10/3/28 22.2 36.4 8.27 2 32 195 0 r n 10/4/28 22.2 36.4 8.27 2 32 196 0 r n 10/4/28 22.2 36.4 8.27 2 32 198 100 oc n 10/4/28 22.2 36.4 8.24 4 41 232 0 r p 11/12/28 22.4 35.3 8.12 38 45 256 0 r n 11/19/28 22.4 35.3 8.12 38 46 261 0 r n 11/19/28 22.4 35.3 8.12 38 46 261 0 r n 11/19/28 22.4 35.3 8.12 38 46 263 100 r n 11/19/28 23.2 35.3 8.16 36 46 264 0 r p 11/12/28 23.2 35.3 8.16 36 46 265 50 r n 11/19/28 23.2 35.3 8.16 36 46 266 50 r n 11/19/28 23.2 35.3 8.16 36 46 266 50 r n 11/19/28 23.2 35.3 8.16 36 46 263 100 r n 11/19/28 22.7 36.2 8.23 20 47 268 100 r n 11/19/28 23.2 35.3 8.16 36 46 264 0 r p 11/12/28 23.2 35.3 8.16 36 47 266 50 r n 11/21/28 23.2 35.3 8.16 36 48 273 100 r n 11/19/28 22.5 35.4 8.17 40 49 279 100 r n 11/12/28 23.2 35.3 8.16 36 49 279 100 r n 11/21/28 23.2 35.3 8.16 40 49 279 100 r n 11/21/28 23.2 35.3 8.16 40 40 282 100 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/21/28 23.2 35.3 8.16 40 48 273 100 r n 11/21/28 23.2 35.3 8.16 40 49 279 100 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/21/28 23.3 35.3 8.16 40 48 273 100 r n 11/21/28 23.3 35.3 8.16 40 49 279 100 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/21/28 23.2 35.3 8.16 40 48 273 100 r n 11/21/28 23.3 35.3 8.16 40 49 279 100 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/21/28 23.2 35.3 8.16 40 48 273 100 r n 11/21/28 23.2 35.3 8.16 40 49 279 100 r n 11/21/28 23.5 35.4 8.17 40 48 273 100 r n 11/21/28 23.5 35.8 8.19 38 49 550 7 n 12/26/29 24.2 29.5 35.6 8.8 19 38 49 77 50 r n 12/26/29 24.2 29.5 34.4 8.10 40 40 23 |         |        |           |                    |                |          | 17.5             |                    | 7.99 | 123                                  |
| 23   | 23      |        |           |                    |                |          | 27.2             |                    | 8.25 |                                      |
| 24 155 50 r n 8,31/28 23.1 36.0 8.14 8 25 15.7 0 r p 9/3/28 21.5 36.0 8.14 8 25 161 50 r n 9/3/28 21.5 36.0 8.22 12 27 172 100 oc n 9/3/28 21.5 36.0 8.22 12 27 172 100 oc n 9/7/28 17.7 36.0 8.22 12 28 174 50 r p 9/11/28 26.7 36.3 8.26 4 29 179 0 r p 9/13/28 27.6 36.2 8.36 4 33 30 186 50 r p 9/15/28 27.8 36.1 8.29 3 30 186 50 r n 9/5/28 27.8 36.1 8.29 3 31 191 0 oc n 10/3/28 26.5 34.4 8.27 2 32 195 50 r n 10/5/28 27.2 36.0 8.23 2 32 195 50 r n 10/5/28 27.2 36.0 8.23 2 32 195 50 r n 10/5/28 27.2 36.0 8.24 2 32 32 195 50 r n 10/5/28 27.2 36.0 8.24 2 33 31 194 0 r n 10/5/28 27.2 36.0 8.24 2 2 32 195 50 r n 10/5/28 27.2 36.0 8.24 2 4 4 3 2 3 3 3 198A 50 r p 10/8/28 22.2 36.4 8.10 30 33 198A 50 r p 11/8/28 22.2 36.4 8.10 30 33 198A 50 r p 11/8/28 22.2 36.2 8.24 4 4 3 2 40 0 r n 11/12/28 (18.7 34.7 8.06 45) 445 256 0 r n 11/12/28 (18.7 34.7 8.06 45) 45 26 0 r n 11/12/28 22.4 35.3 8.10 30 46 254 50 r n 11/12/28 22.4 35.3 8.10 30 46 261 0 r n 11/12/28 22.4 35.3 8.10 36 46 261 0 r n 11/12/28 22.3 35.3 8.16 36 46 262 50 r n 11/21/28 23.2 35.3 8.16 36 46 263 50 r n 11/21/28 23.2 35.3 8.16 36 46 263 50 r n 11/21/28 23.2 35.3 8.16 36 46 263 50 r n 11/21/28 23.2 35.3 8.16 36 46 264 0 r n 11/21/28 23.2 35.3 8.16 36 46 265 50 r n 11/21/28 23.2 35.3 8.16 36 46 265 50 r n 11/21/28 23.2 35.3 8.16 36 46 265 50 r n 11/21/28 23.2 35.3 8.16 40 36 289 100 r n 11/21/28 23.2 35.3 8.16 36 40 47 268 100 r n 11/21/28 23.2 35.3 8.16 40 50 289 100 r n 11/21/28 23.2 35.3 8.16 40 50 289 100 r n 11/21/28 23.3 35.3 8.16 40 50 289 100 r n 11/21/28 23.3 35.3 8.16 36 23 20 47 268 100 r n 11/21/28 23.3 35.3 8.16 36 23 20 47 268 100 r n 11/21/28 23.3 35.3 8.16 40 23 20 66 415 100 r n 11/21/28 23.3 35.3 8.16 40 23 20 60 286 100 r n 11/21/28 23.3 35.3 8.16 40 23 20 60 286 100 r n 11/21/28 23.3 35.3 8.16 8.2 13 36 28 22 20 20 20 20 20 20 20 20 20 20 20 20  | 23      | 149    | 50        |                    |                |          | 20.9             |                    |      | 13                                   |
| 25   |         |        |           |                    |                |          | 23.1             |                    |      |                                      |
| 25   |         |        |           |                    |                | 9/31/28  |                  |                    |      |                                      |
| 28   | 25      |        |           |                    |                |          |                  |                    |      | 12                                   |
| 299 179 0 r p 9/13/28 27.6 36.2 8.31 3 30 189 50 r p 9/15/28 27.8 36.1 8.29 3 30 189 50 r n 9/15/28 27.8 36.1 8.29 3 31 191 0 oc n 10/3/28 28.5 34.4 8.27 2 32 194 0 r n 10/5/28 28.5 34.4 8.27 2 32 195 50 r n 10/5/28 28.0 36.0 8.23 2 32 196 100 oc n 10/5/28 22.2 36.4 8.10 30 33 198A 50 r p 10/8/28 22.2 36.4 8.10 30 40 232 0 r p 11/8/28 22.2 36.4 8.10 30 412 240 0 r n 11/12/28 18.7 34.7 8.06 45) 412 240 0 r n 11/12/28 18.7 34.7 8.06 45) 445 256 0 r n 11/19/28 22.4 33.9 8.04 34.4 45 256 0 r n 11/19/28 22.4 35.3 8.10 35.1 8.00 50 466 281 0 r n 11/19/28 22.4 35.3 8.16 36.4 62 62 63 100 r n 11/21/28 23.2 35.3 8.16 40 46 283 100 r n 11/21/28 23.2 35.3 8.16 36.4 46 285 50 r p 11/21/28 23.2 35.3 8.16 40 46 285 50 r n 11/21/28 23.2 35.3 8.16 36.4 47 268 100 r n 11/21/28 22.2 33.3 35.3 8.16 40 46 285 100 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/21/28 23.2 35.3 8.16 36.1 8.07 48.2 49 279 100 r n 11/23/28 22.7 36.2 8.23 20 47 268 100 r n 11/23/28 23.2 35.3 8.16 40 49 279 100 r n 11/23/28 23.2 35.3 8.16 40 49 279 100 r n 11/23/28 22.7 36.2 8.23 20 47 268 100 r n 11/23/28 23.2 35.3 8.16 40 49 279 100 r n 11/23/28 23.2 35.3 8.26 16 50 286 100 r n 11/23/28 22.7 36.2 8.23 20 47 268 300 r n 11/23/28 22.7 36.2 8.23 20 55 286 100 r n 11/23/28 22.7 36.3 8.26 13 50 286 100 r n 11/23/28 22.7 36.3 8.26 15 50 286 100 r n 11/23/28 23.5 35.7 8.22 13 50 286 100 r n 11/23/28 23.5 35.7 8.22 13 50 286 100 r n 11/23/28 23.5 36.3 8.26 16 62 372 50 r n 12/24/28 18.7 35.9 8.26 13 50 286 100 r n 12/24/28 18.7 35.9 8.26 13 50 286 100 r n 12/24/28 31.1 34.4 8.10 40 62 372 50 r n 12/24/28 31.1 34.4 8.10 40 62 372 50 r n 12/24/28 31.1 34.4 8.10 40 62 373 50 r n 12/24/28 31.5 35.6 8.17 68 63 384 100 r n 12/24/28 31.3 34.4 8.10 40 64 396 100 r n 12/24/28 31.5 35.6 8.17 68 64 396 100 r n 12/24/28 31.5 35.6 8.19 38 82 497 50 r n 12/24/29 23.7 36.0 8.19 16 77 474 50 0 r n 12/24/29 24.2 33.7 36.0 8.19 16 77 474 50 0 r n 12/34/29 23.7 36.0 8.19 16 77 474 50 0 r n 12/34/29 23.7 36.0 8.19 16 77 474 50 0 r n 12/34/29 23.7 36.0 8.19 16 77 474 50 0 r n 12 |         |        |           |                    |                | 9/ 7/28  |                  |                    |      |                                      |
| 32   |         |        |           |                    |                |          |                  |                    |      | 3                                    |
| 32   |         |        |           |                    |                |          |                  |                    |      | 3                                    |
| 32   |         |        |           |                    | n              | 9/15/28  |                  |                    |      | 3                                    |
| 32   |         |        |           |                    |                | 10/ 3/28 |                  |                    |      | 2                                    |
| 32   | 32      |        |           |                    |                | 10/ 5/28 |                  |                    |      | 2                                    |
| 410 232 0 r p 11/8/28 22.2 33.7 8.21 24 41a 240 0 r n 11/12/28 (18.7 34.7 8.06 45) 444 254 50 r n 11/12/28 (20.4 34.9 8.04 34.9 455 256 0 r n 11/19/28 22.4 35.3 8.12 38 455 256 0 r n 11/19/28 22.4 35.3 8.12 38 46 261 0 r n 11/19/28 23.3 35.3 8.16 36 46 261 0 r n 11/21/28 23.3 35.3 8.16 36 46 262 50 r n 11/21/28 23.3 35.3 8.16 36 46 263 100 r n 11/21/28 23.2 35.3 8.16 40 46 263 100 r n 11/21/28 23.2 35.3 8.16 40 47 267 50 r n 11/21/28 23.2 35.3 8.16 40 47 267 50 r n 11/23/28 23.2 35.3 8.16 40 47 267 50 r n 11/23/28 23.8 36.0 8.23 20 48 273 100 n r n 11/23/28 22.7 36.2 8.23 20 48 273 100 r n 11/27/28 21.6 35.9 8.26 13 50 286 100 r p 11/27/28 21.6 35.9 8.26 13 50 286 100 r p 11/27/28 21.6 35.9 8.26 13 50 286 100 r p 11/29/28 20.5 35.7 8.22 13 50 286 100 r n 11/29/28 20.5 35.7 8.22 13 50 286 100 r n 11/29/28 10.6 35.9 8.26 13 50 287 100 r n 11/29/28 10.6 35.9 8.26 13 50 288 100 r p 11/27/28 11.6 35.9 8.26 13 50 289 100 r p 11/27/28 11.6 35.9 8.26 13 50 280 100 r n 11/29/28 10.6 35.9 8.26 13 50 280 100 r n 11/29/28 10.6 35.9 8.26 13 50 280 100 r n 12/20/28 18.7 35.4 8.16 20 55 324 50 r n 12/16/28 18.7 35.4 8.16 20 57 337 100 oc n 12/20/28 14.3 34.4 8.10 40 62 372 50 r n 12/16/28 14.3 34.4 8.10 40 62 373 50 r n 12/18/28 16.6 34.8 8.11 12 57 337 100 oc n 12/20/28 14.3 34.4 8.10 40 62 372 50 r n 12/18/29 15.6 34.6 8.08 24 64 396 100 r p 1/290/28 14.3 34.4 8.10 40 65 372 50 r n 12/20/28 14.3 34.4 8.10 40 66 415 100 r p 1/20/28 14.3 34.4 8.10 40 67 373 40 100 r p 1/20/28 14.3 34.4 8.10 40 68 384 100 r p 1/20/28 14.3 34.4 8.10 40 69 372 50 r n 12/20/28 14.3 34.4 8.10 40 60 1 r n 12/30/28 13.1 34.2 8.06 8.19 16 61 396 415 100 r n 1/20/28 13.1 34.2 8.06 8.19 16 63 384 100 r p 1/20/29 23.5 36.0 8.19 16 64 396 100 r n 1/20/29 23.7 36.0 8.19 16 67 474 50 oc p 2/18/29 23.7 36.0 8.19 16 68 398 50 r n 2/20/29 23.8 36.1 8.19 16 69 395 551 50 r n 2/20/29 26.5 36.8 8.27 29 94 558 50 r n 2/26/29 26.5 36.1 8.25 14 94 558 50 r n 2/26/29 26.5 36.1 8.25 14 94 558 50 r n 3/31/29 28.5 36.5 8.25 14  | 32      | 196    |           | oc                 | n              | 10/ 5/28 |                  |                    |      |                                      |
| 41a 240 0 r n 11/12/28 (18.7 34.7 8.06 45) 44 254 50 r p 11/17/28 20.4 34.9 8.04 34 45 256 0 r n 11/19/28 22.4 35.3 8.12 38 45 258 100 r n 11/19/28 18.6 35.1 8.00 50 46 261 0 r n 11/19/28 23.2 35.3 8.16 36 46 262 50 r n 11/21/28 23.2 35.3 8.16 36 46 263 100 r n 11/21/28 23.2 35.3 8.16 40 46 264 0 r p 11/21/28 23.2 35.3 8.16 36 46 265 50 r n 11/21/28 23.2 35.3 8.16 40 47 267 50 r n 11/21/28 23.2 35.3 8.16 36 48 265 50 r n 11/21/28 23.2 35.3 8.16 40 47 268 100 r n 11/23/28 23.2 35.3 8.16 40 47 268 100 r n 11/23/28 23.2 35.3 8.16 40 49 279 100 r n 11/25/28 22.7 36.2 8.23 20 48 273 100 r n 11/25/28 22.7 36.3 8.26 16 49 279 100 r n 11/27/28 21.6 35.9 8.26 13 50 286 100 r n 11/27/28 21.6 35.9 8.26 13 50 289 100 r p 11/27/28 21.6 35.9 8.26 13 50 289 100 r n 11/29/28 20.5 35.7 8.22 13 50 289 100 r n 12/29/28 20.5 35.7 8.22 13 50 289 100 r n 12/14/28 18.7 35.4 8.16 20 55 324 50 r n 12/16/28 18.7 35.4 8.16 20 55 337 30 100 r n 12/14/28 18.7 35.4 8.16 20 57 337 100 oc n 12/18/28 16.6 34.8 8.11 12 57 337 100 or n 12/18/28 16.6 34.8 8.11 12 57 37 37 100 or n 12/18/28 16.6 34.8 8.11 12 57 37 37 100 or n 12/18/28 16.6 34.8 8.11 25 57 37 37 100 or n 12/18/28 16.6 34.8 8.11 25 57 37 37 100 or n 12/18/28 16.6 34.8 8.11 22 57 38 38 40 100 r n 12/18/28 16.6 34.8 8.11 22 57 38 38 40 100 r n 12/18/28 16.6 34.8 8.11 22 57 38 40 100 r n 12/18/28 16.6 34.8 8.11 22 57 38 40 100 r n 12/18/28 16.6 34.8 8.11 22 57 38 40 100 r n 12/18/28 16.6 34.8 8.11 22 57 38 40 100 r n 12/18/28 16.6 34.8 8.10 40 62 372 50 r n 12/20/28 14.3 34.4 8.10 40 62 372 50 r n 12/20/28 14.3 34.4 8.10 40 62 375 50 r n 12/20/28 14.3 34.4 8.10 40 62 375 50 r n 12/20/28 14.3 34.4 8.10 32 66 415 100 r n 12/20/28 14.3 34.4 8.10 32 67 77 472 0 r n 12/20/28 14.3 34.5 8.10 32 68 38 4 100 r p 1/7/29 27.6 34.8 8.10 32 69 38 553 100 r n 2/28/29 23.7 36.0 8.19 16 69 37 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 44   |         |        |           |                    |                | 11/12/28 |                  |                    |      |                                      |
| 45   | 44      |        |           | r                  | p              | 11/17/28 |                  |                    |      |                                      |
| 46   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 46   |         |        |           |                    |                | 11/21/28 |                  |                    |      |                                      |
| 46   |         |        |           |                    |                | 11/21/28 |                  |                    |      |                                      |
| 46   |         |        |           |                    |                | 11/21/28 |                  |                    |      |                                      |
| 47  268  100   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 48 273 100 n r 11/25/28 22.7 36.3 8.26 16 49 279 100 r n 11/27/28 21.6 35.9 8.26 13 49 282 100 r p 11/27/28 21.6 35.9 8.26 13 50 286 100 r n 11/29/28 20.5 35.7 8.22 13 50 289 100 r n 12/29/28 20.5 35.7 8.22 13 52 301 100 r n 12/3/28 18.2 35.2 8.17 8 54 321 100 r n 12/14/28 18.7 35.4 8.16 20 55 324 50 r n 12/16/28 18.7 35.0 8.18 12 56 330 100 r n 12/18/28 16.6 34.8 8.11 12 57 337 100 oc n 12/20/28 14.3 34.4 8.10 40 57 340 100 r p 12/20/28 14.3 34.4 8.10 40 57 340 100 r n 12/30/28 16.2 34.3 8.10 28 62 373 50 r n 12/30/28 16.2 34.3 8.10 28 62 373 100 r n 12/30/28 13.1 34.2 8.06 48 62 375 50 r n 12/30/28 13.1 34.2 8.06 48 62 375 50 r n 12/30/28 13.1 34.2 8.06 48 63 384 100 r p 12/30/28 13.1 34.2 8.06 48 64 396 100 r n 1/3/29 15.6 34.6 8.08 24 64 396 100 r n 1/3/29 15.8 34.5 8.10 32 66 415 100 r p 1/7/29 15.8 34.5 8.10 32 66 415 100 r p 2/18/29 23.7 36.0 8.19 16 77 472 0 r p 2/18/29 23.7 36.0 8.19 16 77 473 0 r p 2/18/29 23.7 36.0 8.19 16 77 474 50 oc p 2/18/29 23.7 36.0 8.19 16 77 474 50 oc p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 26.5 36.1 8.26 20 93 551 50 r n 3/31/29 27.6 35.8 8.27 39 94 558 50 r n 4/22/29 29.3 34.7 8.60 8.21 25   |         |        |           | r                  | n              | 11/23/28 |                  |                    |      |                                      |
| 49 282 100 r p 11/27/28 21.6 35.9 8.26 13 49 282 100 r p 11/27/28 21.6 35.9 8.26 13 50 286 100 r n 11/29/28 20.5 35.7 8.22 13 50 289 100 r p 11/29/28 20.5 35.7 8.22 13 52 301 100 r n 12/3/28 18.2 35.2 8.17 8 54 321 100 r n 12/14/28 18.7 35.4 8.16 20 55 324 50 r n 12/16/28 18.7 35.0 8.18 12 56 330 100 r n 12/16/28 18.7 35.0 8.18 12 57 337 100 oc n 12/20/28 14.3 34.4 8.10 40 62 372 50 r n 12/30/28 14.3 34.4 8.10 40 62 373 100 r n 12/30/28 16.2 34.3 8.10 28 62 375 50 r n 12/30/28 16.2 34.3 8.10 28 63 384 100 r n 12/30/28 16.2 34.3 8.10 28 64 396 100 r n 1/29/29 15.6 34.6 8.08 24 64 396 100 r n 1/29/29 15.8 34.5 8.10 32 66 415 100 r p 2/12/29 24.2 35.6 8.17 67 472 0 r n 2/18/29 23.7 36.0 8.19 16 77 473 0 r p 2/12/29 24.2 35.6 8.17 68 476 50 r n 2/26/29 23.7 36.0 8.19 16 77 474 50 oc p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/26/29 28.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.4 35.9 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.27 29 94 558 50 r n 3/31/29 27.6 35.8 8.27 29  |         |        |           |                    |                | 11/23/28 |                  |                    |      |                                      |
| 50         286         100         r         n         11/29/28         20.5         35.7         8.22         13           50         289         100         r         p         11/29/28         20.5         35.7         8.22         13           52         301         100         r         n         12/3/28         18.2         35.2         8.17         8           54         321         100         r         n         12/14/28         18.7         35.4         8.16         20           55         324         50         r         n         12/16/28         18.7         35.4         8.16         20           56         330         100         r         n         12/18/28         16.6         34.8         8.11         12           57         340         100         r         p         12/20/28         14.3         34.4         8.10         40           62         372         50         r         n         12/30/28         16.2         34.3         8.10         28           62         373         100         r         n         12/30/28         16.2         34.3         8.10   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 50   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 52       301       100       r       n       12/3/28       18.2       35.2       8.17       8         54       321       100       r       n       12/14/28       18.7       35.4       8.16       20         55       324       50       r       n       12/16/28       18.7       35.0       8.18       12         56       330       100       r       n       12/16/28       18.7       35.0       8.18       12         57       337       100       oc       n       12/20/28       14.3       34.4       8.10       40         57       340       100       r       p       12/20/28       14.3       34.4       8.10       40         62       372       50       r       n       12/30/28       16.2       34.3       8.10       28         62       373       100       r       n       12/30/28       13.1       34.2       8.06       48         62       375       50       r       p       12/30/28       16.2       34.3       8.10       28         63       384       100       r       p       1/1/29       15.6 <td></td>   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 55         324         50         r         n         12/16/28         18.7         35.0         8.18         12           56         330         100         r         n         12/18/28         16.6         34.8         8.11         12           57         337         100         oc         n         12/20/28         14.3         34.4         8.10         40           62         372         50         r         n         12/30/28         16.2         34.3         8.10         28           62         373         100         r         n         12/30/28         16.2         34.3         8.10         28           62         375         50         r         p         12/30/28         16.2         34.3         8.10         28           62         375         50         r         p         12/30/28         16.2         34.3         8.10         28           62         375         50         r         p         12/30/28         16.2         34.3         8.10         28           63         384         100         r         p         1/7/29         15.6         34.6         8.08   |         |        |           |                    |                | 12/ 3/28 |                  |                    |      | 8                                    |
| 56       330       100       r       n       12/18/28       16.6       34.8       8.11       12         57       337       100       oc       n       12/20/28       14.3       34.4       8.10       40         57       340       100       r       p       12/20/28       14.3       34.4       8.10       40         62       372       50       r       n       12/30/28       16.2       34.3       8.10       28         62       373       100       r       n       12/30/28       16.2       34.3       8.10       28         62       375       50       r       p       12/30/28       16.2       34.3       8.10       28         63       384       100       r       p       12/30/28       16.2       34.3       8.10       28         64       396       100       r       n       11/29       15.6       34.6       8.08       24         64       396       100       r       n       11/29       15.8       34.5       8.10       32         74       472       0       r       p       2/12/29       24.2   |         |        |           | r                  | n              | 12/14/28 |                  |                    |      |                                      |
| 57         337         100         oc         n         12/20/28         14.3         34.4         8.10         40           57         340         100         r         p         12/20/28         14.3         34.4         8.10         40           62         372         50         r         n         12/30/28         16.2         34.3         8.10         28           62         373         100         r         n         12/30/28         16.2         34.3         8.10         28           62         375         50         r         p         12/30/28         16.2         34.3         8.10         28           63         384         100         r         p         1/1/29         15.6         34.6         8.08         24           64         396         100         r         n         1/3/29         15.8         34.5         8.10         32           66         415         100         r         p         1/7/29         17.8         34.9         8.12         21           74         472         0         r         n         2/18/29         23.7         36.0         8.19   |         |        |           | r                  |                | 12/10/28 |                  |                    |      |                                      |
| 57       340       100       r       p       12/20/28       14.3       34.4       8.10       40         62       372       50       r       n       12/30/28       16.2       34.3       8.10       28         62       375       50       r       p       12/30/28       16.2       34.3       8.10       28         63       384       100       r       p       1/1/29       15.6       34.6       8.08       24         64       396       100       r       n       1/3/29       15.8       34.5       8.10       32         66       415       100       r       p       1/7/29       17.8       34.9       8.12       21         74       459       0       r       p       2/12/29       24.2       35.6       8.17       68         77       472       0       r       n       2/18/29       23.7       36.0       8.19       16         77       473       0       r       p       2/18/29       23.7       36.0       8.19       16         78       476       50       oc       p       2/18/29       23.5   | 57      | 337    | 100       |                    |                | 12/20/28 | 14.3             | 34.4               | 8.10 | 40                                   |
| 62 373 100 r n 12/30/28 13.1 34.2 8.06 48 62 375 50 r p 12/30/28 16.2 34.3 8.10 28 63 384 100 r p 1/1/29 15.6 34.6 8.08 24 64 396 100 r n 1/3/29 15.8 34.5 8.10 32 66 415 100 r p 1/7/29 17.8 34.9 8.12 21 74 459 0 r p 2/12/29 24.2 35.6 8.17 68 77 472 0 r n 2/18/29 23.7 36.0 8.19 16 77 473 0 r p 2/18/29 23.7 36.0 8.19 16 77 474 50 oc p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/20/29 23.8 36.1 8.14 32 81 491 0 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.4 35.9 8.19 38 81 492 50 r n 2/26/29 26.4 35.9 8.19 38 81 492 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34  | 57      |        |           |                    |                |          |                  | 34.4               |      |                                      |
| 62 375 50 r p 12/30/28 16.2 34.3 8.10 28 63 384 100 r p 1/1/29 15.6 34.6 8.08 24 64 396 100 r n 1/3/29 15.8 34.5 8.10 32 66 415 100 r p 1/7/29 17.8 34.9 8.12 21 74 459 0 r p 2/12/29 24.2 35.6 8.17 68 77 472 0 r n 2/18/29 23.7 36.6 8.19 16 77 473 0 r p 2/18/29 23.7 36.0 8.19 16 77 474 50 0c p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/20/29 23.8 36.1 8.14 32 81 491 0 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.4 35.9 8.19 38 82 497 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 28.5 36.1 8.26 20 93 551 50 r n 3/31/29 28.5 36.8 8.27 29 94 558 50 r n 4/22/29 28.5 35.6 8.21 25  |         |        |           |                    |                |          |                  | 34.2               |      |                                      |
| 63   | 62      | 375    | 50        |                    |                | 12/30/28 | 16.2             | 34.3               | 8.10 | 28                                   |
| 66 415 100 r p 1/7/29 17.8 34.9 8.12 21 74 459 0 r p 2/12/29 24.2 35.6 8.17 68 77 472 0 r n 2/18/29 23.7 36.6 8.19 16 77 473 0 r p 2/18/29 23.7 36.0 8.19 16 77 474 50 oc p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/20/29 23.8 36.1 8.14 32 81 491 0 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.5 35.8 8.19 38 82 497 50 r n 2/26/29 26.4 35.9 8.19 38 82 497 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.2 36.3 8.21 34 87 522 50 r n 3/31/29 27.6 35.8 8.39 93 553 100 r p 3/31/29 27.6 35.8 8.27 29 94 558 50 r n 4/22/29 28.5 35.6 8.21 25   |         |        |           |                    | p              | 1/ 1/29  |                  |                    |      |                                      |
| 74   |         |        |           |                    |                | 1/ 7/29  |                  |                    |      |                                      |
| 77 472 0 r n 2/18/29 23.7 36.6 8.19 16 77 473 0 r p 2/18/29 23.7 36.0 8.19 16 77 474 50 oc p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/20/29 23.8 36.1 8.14 32 81 491 0 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.4 35.9 8.19 38 82 497 50 r n 2/26/29 26.4 35.9 8.19 38 82 497 50 r n 3/11/29 26.5 36.1 8.26 93 553 500 r n 3/11/29 26.5 36.1 8.26 93 555 50 r n 3/31/29 27.6 35.8 8.27 94 558 50 r n 4/22/29 28.5 35.6 8.21 25  | 74      | 459    | 0         | r                  | p              | 2/12/29  | 24.2             | 35.6               | 8.17 | 68                                   |
| 77 474 50 oc p 2/18/29 23.5 36.0 8.19 16 78 476 50 r n 2/20/29 23.8 36.1 8.14 32 81 491 0 r n 2/26/29 26.5 35.8 8.19 38 81 492 50 r n 2/26/29 26.4 35.9 8.19 38 82 497 50 r n 2/26/29 27.2 36.3 8.21 34 87 522 50 r n 3/11/29 26.5 36.1 8.26 20 93 551 50 r n 3/31/29 28.5 34.8 8.30 28 93 553 100 r p 3/31/29 27.6 35.8 8.27 29 94 558 50 r n 4/22/29 28.5 35.6 8.21 25   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 78   |         |        |           |                    |                | 2/18/29  |                  |                    |      | 16                                   |
| 81 492 50 r n 2/26/29 26.4 35.9 8.19 38<br>82 497 50 r n 2/28/29 27.2 36.3 8.21 34<br>87 522 50 r n 3/11/29 26.5 36.1 8.26 20<br>93 551 50 r n 3/31/29 28.5 34.8 8.30 28<br>93 553 100 r p 3/31/29 27.6 35.8 8.27 29<br>94 558 50 r n 4/22/29 28.5 35.6 8.21 25  | 78      | 476    | 50        | r                  | n              | 2/20/29  | 23.8             | 36.1               | 8.14 |                                      |
| 82 497 50 r n 2/28/29 27.2 36.3 8.21 34<br>87 522 50 r n 3/11/29 26.5 36.1 8.26 20<br>93 551 50 r n 3/31/29 28.5 34.8 8.30 28<br>93 553 100 r p 3/31/29 27.6 35.8 8.27 29<br>94 558 50 r n 4/22/29 29.3 34.7 8.25 14<br>94 559 100 r n 4/22/29 28.5 35.6 8.21 25   |         |        |           |                    |                |          |                  |                    |      |                                      |
| 87 522 50 r n 3/11/29 26.5 36.1 8.26 20<br>93 551 50 r n 3/31/29 28.5 34.8 8.30 28<br>93 553 100 r p 3/31/29 27.6 35.8 8.27 29<br>94 558 50 r n 4/22/29 29.3 34.7 8.25 14<br>94 559 100 r n 4/22/29 28.5 35.6 8.21 25  | 82      |        |           |                    |                |          |                  |                    |      |                                      |
| 93 551 50 r n 3/31/29 28.5 34.8 8.30 28<br>93 553 100 r p 3/31/29 27.6 35.8 8.27 29<br>94 558 50 r n 4/22/29 29.3 34.7 8.25 14<br>94 559 100 r n 4/22/29 28.5 35.6 8.21 25   | 87      | 522    | 50        | r                  |                | 3/11/29  | 26.5             | 36.1               | 8.26 | 20                                   |
| 94 558 50 r n 4/22/29 29.3 34.7 8.25 14<br>94 559 100 r n 4/22/29 28.5 35.6 8.21 25  |         |        |           |                    |                | 3/31/29  |                  |                    |      |                                      |
| 94 559 100 r n 4/22/29 28.5 35.6 8.21 25   |         |        |           |                    |                |          |                  |                    |      |                                      |
|  | 94      | 559    | 100       | r                  | n              | 4/22/29  | 28.5             | 35.6               | 8.21 | 25                                   |
|  | 95      | 563    | 50        | ос                 | n              | 4/24/29  | 29.3             | 34.9               | 8.24 | 16                                   |

Table 41. Distributional and environmental records for Ceratium ranipes Cleve--Concluded

| 100<br>101<br>101<br>103<br>107<br>108<br>109<br>109<br>112<br>112<br>113<br>113   | 564<br>568<br>569<br>570<br>571<br>572<br>574<br>575<br>581<br>582<br>583<br>588<br>591<br>592<br>593<br>596<br>605<br>616<br>647<br>648<br>656<br>675<br>676 | 100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>10   | oc r oc oc r r oc oc oc r r r r r r r r                 | n p n n p p n n n p p n n p p n n p p n n n p p n n n p p n n n p                      | 4/24/29 4/26/29 4/26/29 4/26/29 4/26/29 4/26/29 4/28/29 4/28/29 4/30/29 4/30/29 4/30/29 4/30/29 5/ 2/29 5/ 2/29 5/ 2/29 5/ 2/29 5/ 4/29 5/ 4/29 5/ 4/29 5/ 4/29 5/ 4/29 5/ 4/29 5/ 4/29 5/ 1/28 5/ 1/29  | 28.5<br>29.3<br>29.3<br>29.2<br>28.2<br>29.3<br>28.0<br>27.6<br>27.0<br>26.9<br>26.7<br>26.9<br>27.9<br>27.8<br>27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6 | 35.4<br>35.3<br>35.3<br>35.3<br>35.3<br>35.3<br>35.4<br>35.3<br>35.4<br>35.3<br>35.4<br>35.4   | 8.22<br>8.24<br>8.23<br>8.19<br>8.23<br>8.16<br>8.16<br>8.16<br>8.14<br>8.16<br>8.14<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.23<br>8.23<br>8.23<br>8.24<br>8.23<br>8.24<br>8.21<br>8.22<br>8.21<br>8.23<br>8.23<br>8.24<br>8.24<br>8.24<br>8.25<br>8.26<br>8.26<br>8.26<br>8.27<br>8.27<br>8.27<br>8.27<br>8.27<br>8.27<br>8.27<br>8.27 | 21 16 12 12 25 12 12 24 28 32 12 17 12 12 12 10 10 8 8 8 5 11 4 4 5 5 5  |
|--|---|---|---|--|--|--|--|--|--|
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| 97<br>97<br>97<br>98<br>98<br>98<br>98<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113                          | 574<br>575<br>575<br>582<br>583<br>588<br>589<br>591<br>592<br>596<br>596<br>605<br>605<br>616<br>647<br>648<br>656<br>656<br>675<br>676                      | 50<br>100<br>50<br>100<br>50<br>100<br>0<br>100<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>10   | r r c c c c c c c c c c c c c c c c c c                 | pnnnnppnnppnnnnnnnnnn  | 4/28/29<br>4/28/29<br>4/28/29<br>4/30/29<br>4/30/29<br>4/30/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/4/29<br>5/4/29<br>5/4/29<br>5/4/29<br>5/7/29<br>5/7/29<br>5/11/29<br>5/11/29<br>5/27/29  | 28.3<br>28.0<br>27.6<br>27.0<br>26.9<br>26.7<br>26.9<br>27.8<br>27.9<br>27.8<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6   | 35.2<br>35.4<br>35.3<br>35.3<br>35.3<br>35.4<br>35.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>35.2<br>35.0<br>35.0<br>35.3   | 8.16<br>8.16<br>8.16<br>8.16<br>8.14<br>8.16<br>8.14<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.23<br>8.24<br>8.23<br>8.24<br>8.23<br>8.24<br>8.23<br>8.24<br>8.25<br>8.26<br>8.26<br>8.26<br>8.26<br>8.26<br>8.26<br>8.26<br>8.26   | 24<br>21<br>25<br>24<br>28<br>32<br>28<br>32<br>12<br>17<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>5<br>5                   |
| 97<br>97<br>98<br>98<br>98<br>98<br>98<br>99<br>99<br>99<br>99<br>99   | 575<br>576<br>582<br>583<br>585<br>589<br>591<br>592<br>593<br>596<br>597<br>598<br>605<br>616<br>647<br>648<br>656<br>656<br>675<br>676                      | 50<br>100<br>0<br>50<br>100<br>50<br>0<br>100<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>10  | oc r oc oc oc r r r r r r r r r r r r r                 | n n n n p p n n p p n n n n n n n n n n  | 4/28/29<br>4/28/29<br>4/30/29<br>4/30/29<br>4/30/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/4/29<br>5/4/29<br>5/4/29<br>5/7/29<br>5/11/29<br>5/11/29<br>5/27/29   | 28.0<br>27.6<br>27.0<br>26.9<br>26.7<br>27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>27.6<br>25.2<br>25.8<br>26.8<br>26.8   | 35.4<br>35.6<br>35.3<br>35.4<br>35.3<br>35.4<br>34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7   | 8.16<br>8.15<br>8.16<br>8.14<br>8.16<br>8.21<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.23<br>8.24<br>8.25<br>8.23<br>8.24<br>8.25<br>8.24<br>8.25<br>8.26<br>8.26<br>8.27   | 21<br>25<br>24<br>28<br>32<br>28<br>32<br>12<br>17<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>5<br>5<br>11                   |
| 97<br>98<br>98<br>98<br>98<br>99<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101  | 576<br>581<br>582<br>583<br>585<br>589<br>591<br>592<br>593<br>595<br>596<br>605<br>616<br>647<br>648<br>656<br>656<br>675<br>676                             | 100<br>50<br>100<br>50<br>0-100<br>0<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50   | r oc r oc oc oc r r oc oc oc r r r r r r                | n n p p n n p p n n p p n n n n n n  | 4/28/29<br>4/30/29<br>4/30/29<br>4/30/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/4/29<br>5/4/29<br>5/4/29<br>5/7/29<br>5/11/29<br>5/11/29<br>5/27/29  | 27.6<br>27.0<br>26.9<br>26.7<br>26.9<br>26.7<br>27.8<br>27.8<br>27.8<br>27.6<br>27.6<br>27.6<br>27.7<br>27.6<br>25.2<br>25.8<br>26.8<br>26.8   | 35.6<br>35.3<br>35.3<br>35.4<br>35.3<br>35.4<br>34.9<br>34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.2<br>34.9<br>35.0<br>35.2   | 8.15<br>8.16<br>8.16<br>8.14<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.23<br>8.24<br>8.25<br>8.23<br>8.24<br>8.25<br>8.26<br>8.26<br>8.27   | 25<br>24<br>28<br>32<br>32<br>17<br>17<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>5<br>5                                     |
| 98<br>98<br>98<br>98<br>99<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101  | 581<br>582<br>583<br>585<br>589<br>591<br>592<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>641<br>648<br>656<br>659<br>675<br>676                      | 0<br>50<br>100<br>50<br>0-100<br>0<br>100<br>50<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>100  | oc r oc oc oc r r oc oc oc r r r r r r r                | n n p p n n p p n n p p n n n n n n n  | 4/30/29<br>4/30/29<br>4/30/29<br>4/30/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29  | 27.0<br>26.9<br>26.7<br>26.7<br>27.9<br>27.8<br>27.8<br>27.6<br>27.6<br>27.6<br>27.7<br>27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>25.2   | 35.3<br>35.3<br>35.4<br>35.4<br>34.9<br>34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.2<br>34.9<br>35.0<br>35.0   | 8.16<br>8.16<br>8.14<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.21<br>8.22<br>8.21<br>8.23<br>8.24<br>8.25<br>8.23<br>8.24<br>8.25<br>8.24<br>8.25<br>8.26   | 24<br>28<br>32<br>28<br>32<br>12<br>17<br>12<br>12<br>10<br>12<br>10<br>8<br>8<br>5<br>5<br>11                               |
| 98<br>98<br>98<br>99<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101  | 582<br>583<br>585<br>589<br>591<br>592<br>593<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>641<br>648<br>656<br>659<br>675<br>676                      | 50<br>100<br>0-100<br>0<br>100<br>0<br>50<br>100<br>0<br>50<br>100<br>50<br>100<br>100<br>1   | r oc oc oc oc or r r r r r r r r r r r r                | n p p n n p p n n p p n n n n n n  | 4/30/29<br>4/30/29<br>4/30/29<br>4/30/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/11/29<br>5/11/29<br>5/27/29  | 26.9<br>26.7<br>26.9<br>26.7<br>27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.7<br>27.6<br>25.2<br>25.8<br>26.8<br>25.2   | 35.3<br>35.4<br>35.3<br>34.9<br>35.0<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>35.2<br>35.0<br>35.0<br>34.8   | 8.16<br>8.14<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.23<br>8.23<br>8.23<br>8.24<br>8.23<br>8.24<br>8.23   | 28<br>32<br>28<br>32<br>12<br>17<br>12<br>12<br>10<br>12<br>10<br>10<br>8<br>8<br>5<br>5                                     |
| 98<br>98<br>98<br>99<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101  | 583<br>585<br>588<br>591<br>592<br>593<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>647<br>648<br>656<br>656<br>659<br>675                             | 100<br>50<br>0-100<br>0<br>100<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>100<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50   | oc r r oc oc oc r r r r r r r r r r r r                 | n p p n n p p n n n p n n n n n n  | 4/30/29<br>4/30/29<br>4/30/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/2/29<br>5/4/29<br>5/4/29<br>5/4/29<br>5/7/29<br>5/7/29<br>5/11/29<br>5/27/29  | 26.7<br>26.9<br>26.7<br>27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.7<br>27.6<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 35.4<br>35.3<br>35.4<br>34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>34.8   | 8.14<br>8.16<br>8.14<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.23<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23   | 32<br>28<br>32<br>12<br>17<br>12<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>5<br>5   |
| 98<br>98<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101  | 585<br>588<br>591<br>592<br>593<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>647<br>648<br>656<br>656<br>675<br>676                                    | 50<br>0-100<br>0<br>100<br>0<br>50<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>10  | r r c c c c c c r r r r r r r r r r r r                 | p<br>p<br>n<br>p<br>p<br>n<br>n<br>p<br>p<br>n<br>n<br>n                               | 4/30/29<br>4/30/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/27/29  | 26.9<br>26.7<br>27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.7<br>27.6<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 35.3<br>35.4<br>34.9<br>34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>34.7<br>35.2<br>35.0<br>35.0<br>34.8   | 8.16<br>8.14<br>8.21<br>8.22<br>8.21<br>8.22<br>8.21<br>8.21<br>8.21<br>8.24<br>8.25<br>8.23<br>8.24<br>8.23<br>8.24<br>8.24   | 28<br>32<br>12<br>17<br>12<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>5<br>5   |
| 98<br>99<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>112<br>112<br>113<br>113<br>113  | 588<br>589<br>591<br>592<br>593<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>647<br>648<br>656<br>659<br>675<br>676                                    | 0-100<br>0<br>100<br>50<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>100  | r oc oc r r oc oc r r r r r r                           | p<br>n<br>p<br>p<br>n<br>n<br>p<br>p<br>n<br>n<br>n                                    | 4/30/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/11/29<br>5/27/29  | 26.7<br>27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.6<br>27.7<br>27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>26.8   | 35.4<br>34.9<br>35.0<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0   | 8.14<br>8.21<br>8.22<br>8.21<br>8.21<br>8.21<br>8.22<br>8.21<br>8.23<br>8.23<br>8.23<br>8.23<br>8.24<br>8.23<br>8.23   | 32<br>12<br>17<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>8<br>5   |
| 99<br>99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>113   | 589<br>591<br>592<br>593<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676                                    | 0<br>100<br>0<br>50<br>100<br>0<br>50<br>100<br>50<br>100<br>50<br>100<br>10  | oc oc r oc oc oc r r r r r r r r r r r r                | n n p p n n n p p n n n n n n  | 5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 1/29<br>5/11/29<br>5/27/29   | 27.9<br>27.8<br>27.9<br>27.6<br>27.6<br>27.6<br>27.7<br>27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>25.2   | 34.9<br>35.0<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0   | 8.21<br>8.22<br>8.21<br>8.21<br>8.21<br>8.21<br>8.21<br>8.23<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23   | 12<br>17<br>12<br>12<br>12<br>10<br>10<br>10<br>8<br>8<br>8  |
| 99<br>99<br>99<br>99<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>113   | 591<br>592<br>593<br>595<br>596<br>597<br>598<br>599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676                                    | 100<br>0<br>50<br>100<br>0<br>50<br>100<br>100<br>50<br>100<br>10   | oc<br>r<br>oc<br>oc<br>oc<br>r<br>r<br>r<br>r<br>r<br>r | n p p n n p p n n n p p n n n n n  | 5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/27/29<br>5/27/29   | 27.8<br>27.9<br>27.8<br>27.6<br>27.6<br>27.7<br>27.6<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 35.0<br>34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.22<br>8.21<br>8.22<br>8.21<br>8.21<br>8.21<br>8.21<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 17<br>12<br>12<br>12<br>10<br>12<br>10<br>10<br>8<br>8<br>5  |
| 99<br>99<br>99<br>100<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>132   | 592<br>593<br>595<br>596<br>597<br>598<br>603<br>605<br>616<br>647<br>648<br>656<br>659<br>675  | 0<br>50<br>0<br>50<br>100<br>0<br>50<br>0<br>100<br>50<br>100<br>100<br>100   | r r cc oc r r r r r r r                                 | p<br>p<br>n<br>n<br>p<br>p<br>n<br>n<br>n  | 5/ 2/29<br>5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/11/29<br>5/27/29  | 27.9<br>27.8<br>27.6<br>27.6<br>27.7<br>27.6<br>25.2<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 34.9<br>34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.21<br>8.22<br>8.21<br>8.21<br>8.22<br>8.21<br>8.21<br>8.24<br>8.23<br>8.24<br>8.23<br>8.18   | 12<br>12<br>10<br>12<br>10<br>10<br>10<br>10<br>10<br>8<br>8<br>5  |
| 99<br>99<br>100<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>112<br>112<br>113<br>113<br>113   | 593<br>595<br>596<br>597<br>598<br>599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676  | 50<br>0<br>50<br>100<br>0<br>50<br>0<br>100<br>50<br>100<br>100<br>100<br>10  | r oc oc r r r r r r                                     | p<br>n<br>n<br>p<br>p<br>n<br>n<br>n   | 5/ 2/29<br>5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29   | 27.8<br>27.9<br>27.6<br>27.6<br>27.7<br>27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.22<br>8.21<br>8.21<br>8.22<br>8.21<br>8.21<br>8.24<br>8.23<br>8.23<br>8.24<br>8.23<br>8.18   | 12<br>12<br>10<br>12<br>10<br>10<br>8<br>8<br>5<br>11  |
| 99<br>100<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>113  | 595<br>596<br>597<br>598<br>599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676   | 0<br>50<br>100<br>0<br>50<br>0<br>100<br>50<br>100<br>100<br>100<br>100   | oc<br>oc<br>r<br>r<br>r<br>r<br>r<br>r<br>r             | n<br>n<br>p<br>p<br>n<br>n<br>n<br>n   | 5/ 2/29<br>5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29<br>5/27/29   | 27.9<br>27.6<br>27.6<br>27.7<br>26.3<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 34.9<br>34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.21<br>8.22<br>8.21<br>8.21<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 12<br>10<br>12<br>10<br>10<br>8<br>8<br>5<br>11  |
| 100<br>100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>113  | 596<br>597<br>598<br>599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>675<br>676   | 50<br>100<br>0<br>50<br>0<br>100<br>50<br>100<br>50<br>100<br>100<br>100  | oc<br>oc<br>r<br>r<br>r<br>r<br>r<br>r<br>r             | n<br>p<br>p<br>n<br>n<br>n<br>n  | 5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29<br>5/27/29  | 27.6<br>27.6<br>27.7<br>27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 34.7<br>34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.21<br>8.22<br>8.21<br>8.21<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 10<br>12<br>10<br>10<br>8<br>8<br>5<br>11  |
| 100<br>100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113  | 597<br>598<br>599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676   | 100<br>0<br>50<br>0<br>100<br>50<br>100<br>50<br>100<br>10  | oc<br>r<br>r<br>r<br>r<br>r<br>r<br>r                   | n<br>p<br>p<br>n<br>n<br>n<br>n  | 5/ 4/29<br>5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29<br>5/27/29  | 27.6<br>27.7<br>27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>26.8   | 34.7<br>34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.22<br>8.21<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 12<br>10<br>10<br>8<br>8<br>5<br>11  |
| 100<br>100<br>101<br>101<br>103<br>107<br>108<br>108<br>109<br>112<br>112<br>113<br>113  | 598<br>599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675   | 0<br>50<br>0<br>100<br>50<br>100<br>50<br>100<br>100<br>100<br>50   | r<br>r<br>r<br>r<br>r<br>r<br>oc<br>r                   | p<br>p<br>n<br>n<br>n<br>n<br>n  | 5/ 4/29<br>5/ 4/29<br>5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29<br>5/27/29   | 27.6<br>26.3<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 34.7<br>34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.21<br>8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 10<br>8<br>8<br>5<br>11<br>4   |
| 100<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113   | 599<br>603<br>605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676   | 0<br>100<br>50<br>100<br>50<br>100<br>100<br>100<br>50  | r<br>r<br>r<br>r<br>r<br>oc<br>r                        | p<br>n<br>n<br>n<br>n<br>n   | 5/ 7/29<br>5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29<br>5/27/29   | 26.3<br>25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 34.7<br>35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.24<br>8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 8<br>8<br>5<br>11<br>4   |
| 101<br>101<br>103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>113  | 605<br>616<br>641<br>647<br>648<br>656<br>659<br>675<br>676   | 100<br>50<br>100<br>50<br>100<br>100<br>100<br>50   | r<br>r<br>r<br>r<br>oc<br>r                             | n<br>n<br>n<br>n<br>n<br>n   | 5/ 7/29<br>5/11/29<br>5/19/29<br>5/27/29<br>5/27/29  | 25.2<br>25.8<br>26.8<br>26.8<br>25.2   | 35.1<br>35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.23<br>8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 8<br>5<br>11<br>4  |
| 103<br>107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>132  | 616<br>641<br>647<br>648<br>656<br>659<br>675<br>676  | 50<br>100<br>50<br>100<br>100<br>100<br>50  | r<br>r<br>r<br>oc<br>r                                  | n<br>n<br>n<br>n   | 5/11/29<br>5/19/29<br>5/27/29<br>5/27/29   | 25.8<br>26.8<br>26.8<br>25.2   | 35.2<br>34.9<br>35.0<br>35.0<br>34.8   | 8.25<br>8.23<br>8.24<br>8.23<br>8.18   | 5<br>11<br>4   |
| 107<br>108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>132   | 641<br>647<br>648<br>656<br>659<br>675<br>676   | 100<br>50<br>100<br>100<br>100<br>50  | r<br>r<br>c<br>oc<br>r                                  | n<br>n<br>n<br>n   | 5/19/29<br>5/27/29<br>5/27/29  | 26.8<br>26.8<br>25.2   | 34.9<br>35.0<br>35.0<br>34.8   | 8.23<br>8.24<br>8.23<br>8.18   | 11<br>4  |
| 108<br>108<br>109<br>109<br>112<br>112<br>113<br>113<br>132  | 647<br>648<br>656<br>659<br>675<br>676  | 50<br>100<br>100<br>100<br>50   | r<br>r<br>oc<br>r                                       | n<br>n<br>n  | 5/27/29<br>5/27/29   | 26.8<br>25.2   | 35.0<br>35.0<br>34.8   | 8.24<br>8.23<br>8.18   | 4  |
| 108<br>109<br>109<br>112<br>112<br>113<br>113  | 648<br>656<br>659<br>675<br>676   | 100<br>100<br>100<br>50   | r<br>oc<br>r  | n<br>n   | 5/27/29  | 25.2   | 35.0<br>34.8   | 8.23<br>8.18   | 4 5 5  |
| 109<br>109<br>112<br>112<br>113<br>113   | 656<br>659<br>675<br>676  | 100<br>100<br>50  | oc<br>r   | n  |  |  | 34.8   | 8.18   | 5  |
| 109<br>112<br>112<br>113<br>113<br>132   | 659<br>675<br>676   | 100<br>50   | r   |  | 5/29/29  | 19.4   |  |  | 5  |
| 112<br>112<br>113<br>113<br>132  | 675<br>676  | 50  |   | n  |  | 40.4   | 940  |  |  |
| 112<br>113<br>113<br>132   | 676   |   | 0.0   |  | 5/29/29  | 19.4   | 34.8   | 8.18<br>8.23   | 7  |
| 113<br>113<br>132  |   |   |   | n  | 6/ 5/29  | 21.7<br>19.8   | 34.6<br>34.7   | 8.20   | 8  |
| 113<br>132   | 004   | 100   | r   | n  | 6/ 5/29  | 23.8   | 34.6   | 8.25   | 5  |
| 132  | 681   | 50<br>100   | r   | n  | 6/25/29<br>6/25/29   | 21.5   | 34.7   | 8.23   | 8  |
|  | 685<br>798  | 50  | r   | p<br>n   | 9/ 8/29  | 17.6   | 33.9   | 8.33   | 19   |
| 133  | 806   | 100   | r   | n  | 9/10/29  | 18.4   | 34.8   | 8.31   | 7  |
| 134  | 810   | 100   | r   | n  | 9/12/29  | 18.1   | 34.6   | 8.34   | 6  |
| 135  | 822   | 100   | r   | n  | 9/14/29  | 18.7   | 34.8   | 8.34   | 6 5  |
| 137  | 838   | 100   | r   | n  | 9/18/29  | 21.5   | 35.1   | 8.30   | 5  |
| 138  | 845   | 100   | r   | n  | 9/20/29  | 22.2   | 34.8   | 8.31   | 3  |
| 145  | 891   | 50  | r   | n  | 10/13/29   | 18.7   | 34.3   | 8.34   | 6  |
| 145  | 892   | 100   | r   | n  | 10/13/29   | 16.0   | 34.1   | 8.31   | 6  |
| 149  | 922   | 100   | r   | n  | 10/21/29   | 20.3   | 34.9   | 8.38   | 6  |
| 150  | 931   | 100   | r   | n  | 10/23/29   | 19.6   | 34.6   | 8.32   | 11   |
| 150  | 936   | 100   | r   | p  | 10/23/29   | 19.6   | 34.6   | 8.32   | 11   |
| 151  | 937   | 0   | r   | n  | 10/26/29   | 26.0   | 34.0   |  | ***  |
| 151  | 938   | 50  | oc  | n  | 10/26/29   | 18.3   | 34.4   | 8.35   | 20   |
| 152  | 948   | 0   | r   | p  | 10/27/29   | 27.4   | 33.7<br>34.4   | 8.39   | 7  |
| 153  | 952   | 50  | oc  | n  | 10/29/29<br>10/29/29   | 28.1<br>20.5   | 34.4   | 8.28   | 31   |
| 153  | 953   | 100   | r   | n  |  | 28.1   | 34.2   | 8.47   | 7  |
| 153  | 955<br>956  | 0<br>50   | r   | p  | 10/29/29 10/29/29  | 28.1   | 34.4   | 8.39   | 7  |
| 153  | 956<br>958  | 0   |   | p  | 10/23/23   | 28.3   | 34.2   | 8.39   | ż  |
| 154<br>154   | 959   | 50  | r<br>oc   | n<br>n   | 10/31/29   | 28.2   | 34.2   | 8.40   | ż  |
| 155  | 965   | 0   | r   | n  | 11/ 2/29   | 27.8   | 34.9   | 8.29   | 29   |
| 155  | 966   | 50  | oc  | n  | 11/ 2/29   | 27.7   | 34.9   | 8.30   | 30   |
| 155  | 967   | 100   | r   | n  | 11/ 2/29   | 27.2   | 35.0   | 8.30   | 35   |
| 156  | 972   | 0   | r   | n  | 11/ 4/29   | 27.6   | 35.0   | 8.34   | 28   |
| 156  | 973   | 50  | r   | n  | 11/ 4/29   | 27.0   | 35.1   | 8.37   | 46   |
| 157  | 978   | 0   | ос  | n  | 11/ 6/29   | 27.1   | 35.3   | 8.27   | 47   |
| 157  | 979   | 50  | r   | n  | 11/ 6/29   | 27.1   | 35.2   | 8.32   | 60   |
| 157  | 980   | 100   | r   | n  | 11/ 6/29   | 26.8   | 35.3   | 8.30   | 64   |
| 158  | 983   | 0   | DC  | n  | 11/ 8/29   | 28.2   | 35.6   | 8.34   | 36   |
| 158  | 984   | 50  | oc  | n  | 11/ 8/29   | 28.2   | 35.6   | 8.39   | 50   |
| 158  | 985   | 100   | OC  | n  | 11/ 8/29   | 27.6   | 35.9   | 8.39   | 48   |
| 159  | 990   | 0   | r   | n  | 11/11/29   | 28.6   | 35.7   | 8.37   | 15   |
| 159  | 991   | 50  | r   | n  | 11/11/29   | 28.5   | 35.7   | 8.39   | 15<br>12   |
|  | 1000<br>1002  | 0<br>50   | r   | n<br>n   | 11/13/29<br>11/13/29   | 28.6<br>28.6   | 35.6<br>35.6   | 8.37<br>8.39   | 15   |

<sup>\*</sup>Only four fingers.

Table 42. Distributional and environmental records for Ceratium macroceros

|                  |            | 10. 21    |           |        |                    | ecords for Cer |              |                     |                       |            |
|------------------|------------|-----------|-----------|--------|--------------------|----------------|--------------|---------------------|-----------------------|------------|
| Station          | Sample     | Depth     | Relative  | Appa-  | Date               | Temperature    | Salinity     | рН                  | PO <sub>4</sub>       | Sub-       |
|                  |            | (m)       | abundance | ratus  |                    | (°C)           | (0/00)       | -                   | mg/m <sup>3</sup>     | species    |
|                  |            | 0         |           |        | E (10 (00          | 24.0           | 00.0         | 0.40                |                       | ,          |
| 1<br>1a          | 1          | 0         | oc<br>r   | n<br>n | 5/12/28<br>5/14/28 | 24.0<br>(22.3  | 36.2<br>36.3 | 8.16<br>8.20        | 34<br>46)             | gal        |
| 1a               | 4<br>5     | ő         | oc        | n      | 5/14/28            | (22.3          | 36.3         | 8.20                | 46)                   | gal<br>gal |
| 1b               | 6          | Ö         | oc        | n      | 5/16/28            | (22.3          | 36.3         | 8.20                | 46)                   | gal        |
| 1b               | 7          | 50        | ос        | n      | 5/16/28            | (22.2          | 36.4         | 8.21                | 39)                   | gal        |
| 2                | 12         | 50        | oc        | n      | 5/18/28            | 20.5           | 36.4         | 8.21                | 46                    | gal        |
| 2<br>2<br>2<br>3 | 13         | 100       | oc        | n      | 5/18/28            | 19.8           | 36.4         | 8.21                | 33                    | gal        |
| 2                | 14         | 0         | c         | n      | 5/18/28            | 20.5           | 36.4         | 8.23                | 58                    | gal        |
| 2                | 15<br>17   | 0         | r         | n      | 5/18/28<br>5/21/28 | 20.5<br>15.5   | 36.4<br>36.1 | 8.23                | 58<br>99              | gal        |
| 3                | 18         | 50        | c<br>oc   | n<br>n | 5/21/28            | 15.0           | 36.0         | 8.15<br>8.19        | 30                    | mac<br>mac |
| 3                | 20         | 0         | oc        | n      | 5/21/28            | 15.5           | 36.1         | 8.15                | 99                    | mac        |
| 5a               | 33         | Õ         | r         | n      | 5/30/28            | (12.4          | 35.6         | 8.15                | 21)                   | mac        |
| 6                | 36         | 50        | r         | n "    | 5/31/28            | 11.6           | 35.6         | 8.12                | 32                    | mac        |
| 6                | 37         | 100       | r         | n      | 5/31/28            | 11.3           | 35.6         | 8.08                | 41                    | mac        |
| 6b               | 43         | 0         | r         | n      | 6/ 2/28            | (12.4          | 35.6         | 8.15                | 21)                   | mac        |
| 6b               | 44         | 0         | r         | n      | 6/ 2/28            | (12.4          | 35.6         | 8.15                | 21)                   | mac        |
| 6b<br>6b         | 45<br>46   | 0         | oc<br>oc  | n<br>n | 6/ 2/28<br>6/ 2/28 | (12.4<br>(12.4 | 35.6<br>35.6 | 8.15<br>8.15        | 21)<br>21)            | mac<br>mac |
| 6c               | 47         | 100       | r         | n      | 6/ 2/28            | (11.3          | 35.6         | 8.08                | 41)                   | mac        |
| 6f               | 53         | 0         | oc        | n      | 7/ 9/28            | (10.6          | 35.4         | 8.11                | 28)                   | mac        |
| 6g               | 54         | 0         | oc .      | n      | 7/10/28            | (10.6          | 35.4         | 8.11                | 28)                   | mac        |
| 6h               | 55         | 0         | a         | n      | 7/11/28            | (10.6          | 35.4         | 8.11                | 28)                   | mac        |
| 7                | 56         | 0         | r         | n      | 7/13/28            | 8.9            | 35.2         | 8.08                | 34                    | mac        |
| 7                | 57         | 50        | oc        | n      | 7/13/28            | 8.2            | 35.2         | 8.03                | 47                    | mac        |
| 7<br>8           | 58<br>59   | 100       | r<br>oc   | n<br>n | 7/13/28<br>7/15/28 | 8.1<br>10.3    | 35.2<br>35.2 | 8.04<br>7.93        | 57<br>13              | mac        |
| 8                | 61         | 100       | r         | n      | 7/15/28            | 8.4            | 35.3         | 7.95                | 54                    | mac<br>mac |
| 8<br>9           | 64         | 0         | c         | n      | 7/28/28            | 11.2           | 35.1         | 8.08                | 20                    | mac        |
| 9                | 65         | 50        | oc        | n      | 7/28/28            | 8.4            | 35.1         | 7.96                | 55                    | mac        |
| 9                | 66         | 100       | r         | n      | 7/28/28            | 7.6            | 35.1         | 7.98                | 56                    | mac        |
| 10               | 68         | 0         | oc        | n      | 7/30/28            | 10.9           | 34.9         | 8.08                | 28                    | mac        |
| 11               | 74         | 50        | oc        | n      | 8/ 1/28            | 7.3            | 34.9         | 7.92                | 63                    | mac        |
| 11               | 75         | 0         | oc        | b      | 8/ 1/28            | 10.7           | 34.9         | 8.06                | 27<br>27)             | mac        |
| 11a<br>12        | 78<br>80   | 50        | oc<br>r   | n      | 8/ 2/28<br>8/ 5/28 | (10.7<br>3.9   | 34.9<br>34.7 | $\frac{8.06}{7.91}$ | 95                    | mac<br>mac |
| 12               | 82         | 0         | r         | p<br>p | 8/ 5/28            | 8.4            | 33.6         | 8.10                | 27                    | mac        |
| 13               | 85         | 50        | r         | n      | 8/ 7/28            | -1.6           | 33.4         | 7.87                | 59                    | gal        |
| 13a .            | 88         | 0         | r         | n      | 8/ 8/28            | (21.2          | 35.2         | 8.18                | 11)                   | mac        |
| 13a              | 89         | 0         | r         | n      | 8/ 8/28            | (11.3          | 32.7         | 8.09                | 19)                   | gal        |
| 14               | 91         | 100       | r         | р      | 8/ 9/28            | 14.0           | 35.6         | 8.06                | 34                    | mac        |
| 14<br>14         | 93         | 100       | oc        | p      | 8/ 9/28<br>8/ 9/28 | 21.2<br>14.0   | 35.2<br>35.6 | 8.18<br>8.06        | 11<br>34              | mac        |
| 15               | 94<br>97   | 0         | oc<br>r   | n<br>p | 8/11/28            | 24.8           | 36.4         | 8.21                | 11                    | mac<br>mac |
| 15               | 98         | 50        | r         | þ      | 8/11/28            | 19.8           | 36.5         | 8.21                | 8                     | mac        |
| 15               | 99         | 100       | oc        | p      | 8/11/28            | 18.4           | 36.4         | 8.20                | 19                    | mac        |
| 15               | 100        | 0         | r         | n      | 8/11/28            | 24.8           | 36.4         | 8.21                | 11                    | mac        |
| 15               | 101        | 50        | oc        | n      | 8/11/28            | 19.8           | 36.5         | 8.21                | 8                     | mac        |
| 15               | 102        | 100       | r         | n      | 8/11/28            | 18.4           | 36.4         | 8.20                | 19                    | mac        |
| 16<br>16         | 103        | 0         | r         | p      | 8/13/28            | 25.9           | 36.2         | 8.24                | 8                     | gal        |
| 16               | 104<br>106 | 50<br>0   | r         | p<br>n | 8/13/28<br>8/13/28 | 24.4<br>25.9   | 36.4<br>36.2 | 8.23<br>8.24        | 8                     | gal<br>mac |
| 16               | 107        | 50        | F         | n      | 8/13/28            | 24.4           | 36.4         | 8.23                | 8                     | mac        |
| 17               | 109        | 0         | oc        | p      | 8/15/28            | 26.2           | 36.6         | 8.29                | 9                     | gal        |
| 17               | 110        | 50        | r         | p      | 8/15/28            | 21.9           | 36.6         | 8.28                | 12                    | gal        |
| 17               | 111        | 0         | r         | n      | 8/15/28            | 26.2           | 36.6         | 8.29                | 9                     | gal        |
| 17               | 112        | 50        | oc        | n      | 8/15/28            | 21.9           | 36.6         | 8.28                | 12                    | gal        |
| 17               | 113<br>114 | 100       | 00        | n      | 8/15/28            | 19.3<br>27.0   | 36.5<br>37.0 | 8.23<br>8.23        | 9                     | gal        |
| 18<br>18         | 114        | 50        | oc<br>c   | p      | 8/17/28<br>8/17/28 | 22.4           | 36.8         | 8.24                | 5<br>5<br>5<br>5<br>5 | gal<br>gal |
| 18               | 116        | 100       | r         | p<br>p | 8/17/28            | 20.4           | 36.8         | 8.21                | 5                     | gal        |
| 18               | 117        | 0         | r         | n      | 8/17/28            | 27.0           | 37.0         | 8.23                | 5                     | gal        |
| 18               | 118        | 50        | c         | n      | 8/17/28            | 22.4           | 36.8         | 8.24                | 5                     | gal        |
| 18               | 119        | 100       | oc        | n      | 8/17/28            | 20.4           | 36.8         | 8.21                | 5                     | gal        |
| 19               | 120        | 0         | oc        | p      | 8/20/28            | 26.6           | 37.0         | 8.34                | 5<br>5<br>5           | gal        |
| 19               | 121        | 50        | oc        | p      | 8/20/28            | 25.2<br>25.2   | 37.1<br>37.1 | 8.27<br>8.27        | 5                     | gal        |
| 19<br>19         | 123<br>124 | 50<br>100 | oc<br>oc  | n<br>n | 8/20/28<br>8/20/28 | 22.4           | 37.0         | 8.25                | 5                     | gal<br>gal |
| 20               | 127        | 100       | r         | p      | 8/22/28            | 22.6           | 36.7         | 8.19                | 5                     | gal        |
| 20               | 128        | 0         | oc        | n      | 8/22/28            | 26.0           | 36.6         | 8.37                | 5                     | gal        |
| 20               | 130        | 100       | oc        | n      | 8/22/28            | 22.6           | 36.7         | 8.19                | 5                     | gal        |
| 20-21            | 131        | 0         | r         | n      | 8/23/28            | (26.6          | 36.3         | 8.32                | 4)                    | gal        |
| 22               | 139        | 0         | r         | p      | 8/27/28            | 26.7           | 36:0         | 8.26                | 8                     | gal        |
| 22               | 143        | 50        | r         | n      | 8/27/28            | 24.5<br>17.5   | 36.2<br>36.1 | 8.21<br>7.99        | 123                   | gal        |
| 22<br>23         | 144<br>145 | 100       | r         | n      | 8/27/28<br>8/29/28 | 27.2           | 35.9         | 8.25                | 4                     | gal<br>gal |
| 23               | 149        | U         | I .       | р      | 0/23/20            | 21.2           | 90.0         | 0.20                | 7                     | Par        |

Table 42. Distributional and environmental records for Ceratium macroceros--Continued

|  |   | Danish  | Dolotino  | A ====   |   | ·  | Calinita.  |  | 70   | 1 0 1  |
|--|---|---|---|--|---|--|--|--|--|--|
| Station  | Sample  | (m)   | abundance   | ratus  | Date  | (°C)   | (0/00)   | pН   | mg/m <sup>3</sup>  | species  |
| Station  23 24 25 26 27 28 29 30 31 32 33 33 34 45 46 46 47 47 47 48 48 48 48 49 49 49 49 49 49 49 49 49 49 49 49 49 | Sample  149 150 155 161 162 163 166 170 178 183 188 189 190 192 194 197A 198 200A 201 202 241 250 257 258 262 263 264 250 257 258 262 263 264 250 271 272 273 274 275 276 278 281 282 285 286 287 297 281 282 285 286 287 297 281 282 283 301 304 305 308 311 316 320 321 324 325 327 328 330 331 316 320 331 | Depth (m)  50 100 50 50 100 0 0 100 0 50 100 | Relative abundance  r r r r r r r r r r r r r r r r r r r | Appa- ratus  nnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnn | 8/29/28 8/29/28 8/31/28 9/ 3/28 9/ 3/28 9/ 5/28 9/ 5/28 9/ 5/28 9/ 5/28 9/ 5/28 9/ 5/28 9/ 11/28 9/15/28 9/15/28 9/15/28 10/ 8/28 10/ 8/28 10/ 8/28 10/ 8/28 10/ 8/28 10/ 8/28 11/ 1/ 1/28 11/ 1/ 1/28 11/ 1/ 1/28 11/ 1/ 1/28 11/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ | Temperature (°C)  20.9 16.6 23.1 21.5 14.6 27.6 27.5 22.8 27.6 27.2 28.0 27.8 24.1 28.2 28.0 28.5 28.2 28.5 20.5 25.0 18.8 27.1 22.2 18.7 13.6 20.7 22.4 18.6 22.7 22.3 23.9 23.8 22.7 23.9 23.8 22.7 23.9 23.8 22.7 23.9 23.8 22.7 23.9 23.8 22.7 23.9 23.8 23.6 22.7 22.6 21.6 (23.0 (23.0 20.5 20.0 20.5 20.0 20.5 20.0 20.5 22.0 | Salinity (0/00)  36.0 36.0 36.0 36.0 36.0 36.0 36.0 36.0 | PH  8.14 8.22 7.93 8.30 8.31 8.22 7.93 8.30 8.23 8.23 8.24 8.28 8.24 8.28 8.20 8.20 8.10 8.13 8.21 8.21 8.21 8.22 8.22 8.23 8.23 8.23 8.23 8.23 8.23 | PO4 mg/m3  13 755 8 12 121 5 5 4 7 3 3 2 2 2 2 4 4 4 2 2 6 3 121 5 5 2 4 4 4 5 2 3 8 4 6 5 5 6 4 7 2 0 2 1 7 2 0 3 1 6 6 1 3 3 1 3 1 3 1 3 1 3 1 3 1 3 1 | species specie |

Table 42. Distributional and environmental records for Ceratium macroceros--Continued

| Station     | Sample       | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub> mg/m <sup>3</sup> | Sub-<br>species |
|-------------|--------------|------------|--------------------|----------------|----------------------|------------------|--------------------|--------------|-----------------------------------|-----------------|
|             |              |            |                    |                | 10:10:100            |                  |                    | 1            |                                   |                 |
| 56-57       | 334          | 0          | oc                 | n              | 12/19/28             | (19.0            | 34.5               | 8.14         | 20)                               | gal             |
| 57          | 335          |            | . oc               | n              | 12/20/28             | 19.0             | 34.5               | 8.14         | 20                                | gal             |
| 57          | 336          | 50         | oc                 | n              | 12/20/28             | 15.6             | 34.3               | 8.14         | 21                                | gal             |
| 57          | 337          | 100        | oc                 | n              | 12/20/28             | 14.3             | 34.4               | 8.10         | 40                                | gal             |
| 57          | 338          | 0          | r                  | p              | 12/20/28             | 19.0             | 34.5               | 8.14         | 20                                | gal             |
| 57          | 3 <b>3</b> 9 | 50         | oc                 | p              | 12/20/28             | 15.6             | 34.3               | 8.14         | 21                                | gal             |
| 57          | 3 <b>4</b> 0 | 100        | r                  | p              | 12/20/28             | 14.3             | 34.4               | 8.10         | 40                                | gal             |
| 58          | 341          | 0          | r                  | n              | 12/22/28             | 17.0             | 34.0               | 8.12         | 20                                | gal             |
| 60          | 355          | 50         | oc                 | n              | 12/26/28             | 13.4             | 34.0               | 8.06         | 54                                | gal             |
| 60<br>60    | 356<br>358   | 100<br>50  | oc                 | n              | 12/26/28             | 10.6             | 34.0<br>34.0       | 8.03<br>8.06 | 62                                | gal             |
| 60          | 359          | 0          | r                  | p<br>p         | 12/26/28<br>12/26/28 | 13.4<br>15.0     | 34.0               | 8.07         | 50                                | gal<br>gal      |
| 60-61       | 360          | 0          | oc                 | n              | 12/26/28             | (15.0            | 34.0               | 8.07         | 50)                               | gal             |
| 61          | 363          |            | c                  | n              | 12/28/28             | 16.9             | 34.0               | 8.05         | 46                                | gal             |
| 61          | 364          | 50         | c                  | n              | 12/28/28             | 14.0             | 34.0               | 8.05         | 60                                | gal             |
| 61          | 365          | 100        | oc                 | n              | 12/28/28             | 10.8             | 34.0               | 8.03         | 80                                |                 |
| 61          | 366          | 0          | С                  | p              | 12/28/28             | 16.9             | 34.0               | 8.05         | 46                                | gal<br>gal      |
| 61          | 367          | 50         | oc                 | p              | 12/28/28             | 14.0             | 34.0               | 8.05         | 60                                | gal             |
| 61-62       | 369          | 0          | oc                 | n              | 12/28/28             | (16.9            | 34.0               | 8.05         | 46)                               | gal             |
| 61-62       | 370          | 0          | oc                 | n              | 12/29/28             | (16.9            | 34.0               | 8.05         | 46)                               | gal             |
| 62          | 371          |            | oc                 | n              | 12/30/28             | 19.2             | 34.2               | 8.12         | 32                                | gal             |
| 62          | 372          | 50         | oc -               | n              | 12/30/28             | 16.2             | 34.3               | 8.10         | 28                                | gal             |
| 62          | 373          | 100        | oc                 | n              | 12/30/28             | 13.1             | 34.2               | 8.06         | 48                                | gal             |
| 62          | 374          | 0          | oc                 | p              | 12/30/28             | 19.2             | 34.2               | 8.12         | 32                                | gal             |
| 62          | 375          | 50         | r                  | p              | 12/30/28             | 16.2             | 34.3               | 8.10         | 28                                | gal             |
| 62          | 376          | 100        |                    | p              | 12/30/28             | 13.1             | 34.2               | 8.06         | 48                                | gal             |
| 62-63       | 377<br>379   | 0          | r                  | n              | 12/31/28             | (20.5<br>20.5    | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21                         | gal             |
| 63<br>63    | 380          | 50         | oc<br>oc           | n<br>n         | 1/ 1/29<br>1/ 1/29   | 17.0             | 34.6               | 8.08         | 25                                | gal<br>gal      |
| 63          | 383          | 50         | r                  | p              | 1/ 1/29              | 17.0             | 34.6               | 8.08         | 25                                | gal             |
| 63-64       | 385          | 0          |                    | n              | 1/ 1/29              | (20.5            | 34.6               | 8.07         | 21)                               | gal             |
| 63-64       | 387          | 0          | r                  | n              | 1/ 2/29              | (20.5            | 34.6               | 8.07         | 21)                               | gal             |
| 64          | 395          | 50         |                    | n              | 1/ 3/29              | 17.2             | 34.6               | 8.12         | 29                                | gal             |
| 64          | 396          | 100        | r                  | n              | 1/ 3/29              | 15.8             | 34.5               | 8.10         | 32                                | gal             |
| 64          | 398          | 0          | r                  | p              | 1/ 3/29              | 20.6             | 34.6               | 8.12         | 21                                | gal             |
| 64-65       | 402          |            | r                  | n              | 1/ 4/29              | (20.6            | 34.6               | 8.12         | 21)                               | gal             |
| 64-65<br>65 | 404<br>405   | 0          | . r                | n<br>n         | 1/ 4/29<br>1/ 5/29   | (20.6<br>20.2    | 34.6<br>34.5       | 8.12<br>8.10 | 21)<br>24                         | gal<br>gal      |
| 65          | 406          | 50         | r                  | n              | 1/ 5/29              | 16.5             | 34.5               | 8.10         | 25                                | gal®            |
| 65          | 408          | 0          | r                  | p              | 1/ 5/29              | 20.2             | 34.5               | 8.10         | 24                                | gal             |
| 65          | 409          | <b>5</b> 0 |                    | p              | 1/ 5/29              | 16.5             | 34.5               | 8.10         | 25                                | gal             |
| 66<br>66    | 411<br>413   | 0          | f r                | 'n<br>p        | 1/ 7/29<br>1/ 7/29   | 19.4<br>19.4     | 34.7<br>34.7       | 8.10<br>8.10 | 29<br>29                          | gal<br>gal      |
| 66<br>66    | 414<br>415   | 50<br>100  | r                  | p              | 1/ 7/29<br>1/ 7/29   | 17.8<br>17.8     | 34.8<br>34.9       | 8.10<br>8.12 | 29<br>21                          | gal<br>gal      |
| 67          | 416          | 0          | С                  | p<br>n         | 1/8/29               | 19.3             | 34.9               | 8.11         | 21                                | gal             |
| 76          | 471          | 50         | r                  | p              | 2/16/29              | 22.1             | 35.9               | 8.14         | 42                                | gal             |
| 77          | 474          | 50         |                    | p              | 2/18/29              | 23.5             | 36.0               | 8.19         | 16                                | gal             |
| 78          | 475          | 0          | oc                 | n              | 2/20/29              | 24.6             | 36.0               | 8.17         | 32                                | gal             |
| 78          | 476          | 50         | oc                 | n              | 2/20/28              | 23.8             | 36.1               | 8.14         | 32                                | gal             |
| 78          | 477          | 100        | oc                 | n              | 2/20/28              | 21.9             | 36.2               | 8.14         | 34<br>32                          | gal             |
| 78          | 478          | 0          | r                  | p              | 2/20/28              | 24.6             | 36.0               | 8.17         | 32                                | gal             |
| 78          | 479          | 50         | oc                 | p              | 2/20/29              | 23.8             | 36.1               | 8.14         |                                   | gal             |
| 78          | 480          | 100        | r                  | p              | 2/20/29              | 21.9             | 36.2               | 8.14         | 34                                | gal             |
| 79          | 481          | 0          | oc                 | n              | 2/22/29              | 25.2             | 36.0               | 8.17         | 34                                | gal             |
| 79          | 482          | 50         | r                  | n              | 2/22/29              | 24.5             | 36.1               | 8.17         | 34                                | gal             |
| 79          | 483          | 100        | oc                 | n              | 2/22/29              | 21.8             | 36.2               | 8.13         | 45                                | gal             |
| 79          | 484          | 0          | r                  | p              | 2/22/29              | 25.2             | 36.0               | 8.17         | 34                                | gal             |
| 80          | 486          | 0          | oc                 | n              | 2/24/29              | 26.0             | 35.9               | 8.20         | 36                                | gal             |
| 80          | 487          | 50         | r                  | n              | 2/24/29              | 25.9             | 36.0               | 8.19         | 29                                | gal             |
| 80          | 488          | 0          | oc                 | p              | 2/24/29              | 26.0             | 35.9               | 8.20         | 36                                | gal             |
| 80          | 489          | 50         | r                  | p              | 2/24/29              | 25.9             | 36.0               | 8.19         | 29                                | gal             |
| 80          | 490          | 100        | r                  | p              | 2/24/29              | 23.4             | 36.2               | 8.16         | 32                                | gal             |
| 81          | 491          | 0          | c                  | n              | 2/26/29              | 26.5             | 35.8               | 8.19         | 38                                | gal             |
| 81          | 492          | 50         | oc                 | n              | 2/26/29              | 26.4             | 35.9               | 8.19         |                                   | gal             |
| 81          | 493          | 0          | oc                 | p              | 2/26/29              | 26.5             | 35.8               | 8.19         | 38                                | gal             |
| 81          | 494          | 50         | oc                 | p              | 2/26/29              | 26.4             | 35.9               | 8.19         | 38                                | gal             |
| 81          | 495          | 100        | r                  | p              | 2/26/29<br>2/28/29   | 23.6<br>27.2     | 36.2<br>36.3       | 8:18<br>8.21 | 36<br>34                          | gal<br>gal      |
| 82<br>82    | 496<br>497   | 50         | oc<br>r            | n<br>n         | 2/28/29              | 27.2             | 36.3               | 8.21         | 34                                | aal             |
| 8 <b>2</b>  | 498          | 0          | oc                 | p              | 2/28/29              | 27.2             | 36.3               | 8.21         | 34                                | gal             |
| 8 <b>2</b>  | 500          | 100        | r                  | p              | 2/28/29              | 24.4             | 36.5               | 8.19         | 34                                | gal             |
| 83          | 501          | 0          | c                  | n              | 3/ 2/29              | 27.5             | 36.3               | 8.24         | 29                                | gal             |
| 83          | 502          | 50         |                    | n              | 3/ 2/29              | 27.4             | 36.3               | 8.24         | 25                                | gal             |
| 83          | 503          | 0          | r                  | p              | 8/ 2/29              | 27.5             | 36.3               | 8.24         | 29                                | gal             |
| 83          | 504          | 50         | oc                 | p              | 3/ 2/29              | 27.4             | 36.5               | 8.24         | 25                                | gal             |

Table 42. Distributional and environmental records for Ceratium macroceros--Continued

| Chadia     | G1-         | Depth       | Relative     | Appa-  |                    | Temperature    | Salinity     |              | PO <sub>4</sub>  | Sub-       |
|------------|-------------|-------------|--------------|--------|--------------------|----------------|--------------|--------------|------------------|------------|
| Station    | Sample      | (m)         | abundance    | ratus  | Date               | (°C)           | (0/00)       | pH           | mg/m3            | species    |
| 84         | 505         | 0           | С            | n      | 3/ 4/29            | 27.8           | 36.2         | 8.23         | 24               | gal        |
| 84         | 506         | 50          | oc           | n      | 3/ 4/29<br>3/ 4/29 | 27.5           | 36.4         | 8.21         | 24               | gal        |
| 84<br>84   | 507<br>508  | 0<br>50     | r            | p      | 3/ 4/29            | 27.8           | 36.2         | 8.23         | 24               | gal        |
| 85         | 510         | 0           | oc<br>oc     | p<br>n | 3/ 4/29<br>3/ 6/29 | 27.5<br>27.9   | 36.4<br>36.2 | 8.21<br>8.22 | 24<br>40         | gal<br>gal |
| 85         | 511         | 50          | oc           | n      | 3/ 6/29            | 27.8           | 36.2         | 8.22         | 40               | gal        |
| 85         | 512         | 0           | r            | p      | 3/ 6/29            | 27.9           | 36.2         | 8.22         | 40               | gal        |
| 85<br>86   | 513<br>516  | 50          | oc<br>oc     | p<br>n | 3/ 6/29<br>3/ 9/29 | 27.8<br>28.3   | 36.2<br>36.2 | 8.22<br>8.29 | 40<br>20         | gal        |
| 86         | 519         | 50          | r            | p      | 3/ 9/29            | 27.4           | 36.2         | 8.29         | 17               | gal<br>gal |
| 87         | 521         | 0           | r            | n      | 3/ 9/29<br>3/11/29 | 27.8           | 36.1         | 8.28         | 17               | gal        |
| 87<br>87   | 522<br>524  | 50<br>50    | oc           | n      | 3/11/29<br>3/11/29 | 26.5           | 36.1         | 8.26         | 20               | gal        |
| 87         | 525         | 100         | r            | p<br>p | 3/11/29            | 26.5<br>23.9   | 36.1<br>36.0 | 8.26<br>8.23 | 20<br>20         | gal<br>gal |
| 88         | <b>52</b> 6 | 0           | oc           | 'n     | 3/21/29            | 28.5           | 35.9         | 8.23         | 16               | gal        |
| 88         | 527         | 50          | ос           | n      | 3/21/29            | 28.4           | 35.9         | 8.25         | 13               | gal        |
| 89<br>89   | 528<br>529  | 0<br>50     | oc<br>· c    | n<br>n | 3/23/29<br>3/23/29 | 28.4<br>28.6   | 35.6<br>35.8 | 8.25<br>8.27 | 21<br>12         | gal        |
| 89         | 530         | 0           | oc           | p      | 3/23/29            | 28.4           | 35.6         | 8.25         | 21               | gal<br>gal |
| 90         | 533         | 0           | oc           | 'n     | 3/25/29            | 28.5           | 35.5         | 8.27         | 21               | gal        |
| 90         | 534         | 50          | oc           | n      | 3/25/29            | 28.6           | 35.6         | 8.26         | 21               | gal        |
| 90<br>90   | 535<br>536  | 0<br>50     | r            | p<br>p | 3/25/29<br>3/25/29 | 28.5 ·<br>28.6 | 35.5<br>35.6 | 8.27<br>8.26 | 21<br>21         | gal<br>gal |
| 91         | 540         | 0           | r            | n      | 3/27/29            | 28.7           | 35.1         | 8.30         | 21               | gal        |
| 91         | 541         | 50          | c            | n      | 3/27/29            | 28.5           | 35.2         | 8.30         | 24               | gal        |
| 91<br>91   | 543<br>544  | 50<br>100   | r            | p      | 3/27/29<br>3/27/29 | 28.5<br>25.8   | 35.2<br>36.0 | 8.30         | 24               | gal        |
| 92         | 545         | , 100       | oc<br>oc     | p<br>n | 3/29/29            | 28.5           | 35.3         | 8.25<br>8.29 | 30<br>28         | gal<br>gal |
| 92         | 546         | 50          | c            | n      | 3/29/29            | 28.4           | 35.4         | 8.29         | 28               | gal        |
| 92         | 547         | 0           | r            | p      | 3/29/29            | 28.5           | 35.3         | 8.29         | 28               | gal        |
| 92<br>93   | 549<br>551  | 100<br>50   | r<br>oc      | p<br>n | 3/29/29<br>3/31/29 | 26.2<br>28.5   | 36.0<br>34.8 | 8.28<br>8.30 | 28<br>28         | gal        |
| 93         | 552         | 0           | r            | p      | 3/31/29            | 28.7           | 34.7         | 8.30         | 28               | gal<br>gal |
| 93         | 553         | 100         | r            | p      | 3/31/29            | 27.6           | 35.8         | 8.27         | 29               | gal        |
| 94<br>94   | 558<br>559  | 50 .<br>100 | r            | n      | 4/22/29            | 29.3<br>28.5   | 34.7<br>35.6 | 8.25         | 14               | gal        |
| 94         | 561         | 50          | oc<br>r      | n<br>p | 4/22/29 4/22/29    | 29.3           | 34.7         | 8.21<br>8.25 | 25<br>14         | gal<br>gal |
| 95<br>95   | 563         | 50          | oc           | n      | 4/24/29            | 29.3           | 34.9         | 8.24         | 16               | gal        |
| 95         | 564         | 100         | oc           | n      | 4/24/29            | 28.5           | 35.4         | 8.22         | 21               | gal        |
| 95<br>96   | 566<br>568  | 50<br>0     | r            | p<br>n | 4/24/29<br>4/26/29 | 29.3<br>29.3   | 34.9<br>35.3 | 8.24<br>8.23 | 16<br>12         | gal<br>gal |
| 95         | 568A        | ŏ           | r            | n      | 4/25/29            | (29.4          | 34.7         | 8.26         | 14)              | gal        |
| 96         | 569         | 50          | $\mathbf{r}$ | n      | 4/26/29            | 29.2           | 35.3         | 8.23         | 12               | gal        |
| 96<br>96   | 570<br>572  | 100<br>50   | oc<br>r      | n      | 4/26/29<br>4/26/29 | 28.2<br>29.2   | 35.7<br>35.3 | 8.19<br>8.23 | 25<br>12         | gal        |
| 97         | 575         | 50          | oc           | p<br>n | 4/28/29            | 28.0           | 35.4         | 8.16         | 21               | gal<br>gal |
| 97         | 576         | 100         | r            | n      | 4/28/29            | 27.6           | 35.6         | 8.15         | 25               | gal        |
| 97<br>98   | 578         | 50          | r            | p      | 4/28/29            | 28.0           | 35.4         | 8.16         | 21               | gal        |
| 98         | 582<br>583  | 50<br>100   | oc<br>r      | n<br>n | 4/30/29<br>4/30/29 | 26.9<br>26.7   | 35.3<br>35.4 | 8.16<br>8.14 | 28<br>32         | gal        |
| 98         | 585         | 50          | r            | p      | 4/30/29            | 26.9           | 35.3         | 8.16         | 28               | gal        |
| 99         | 589         | 0           | r            | n      | 5/ 2/29            | 27.9           | 34.9         | 8.21         | 12               | gal        |
| 99<br>99   | 590<br>591  | 50<br>100   | c<br>c       | n<br>n | 5/ 2/29<br>5/ 2/29 | 27.8<br>27.8   | 34.9<br>35.0 | 8.22<br>8.22 | 12<br>17         | gal        |
| 99         | 592         | 0           | r            | p      | 5/ 2/29            | 27.9           | 34.9         | 8.21         | 12               | gal<br>gal |
| 99         | 595         | 0           | oc           | n      | 5/ 2/29            | 27.9           | 34.9         | 8.21         | 12               | gal        |
| 100<br>100 | 596<br>597  | 50<br>100   | oc           | n      | 5/ 4/29            | 27.6<br>27.6   | 34.7<br>34.7 | 8.21<br>8.22 | 10               | gal        |
| 100        | 598         | 0           | r<br>oc      | n<br>p | 5/ 4/29<br>5/ 4/29 | 27.7           | 34.7         | 8.21         | 12<br>10         | gal<br>gal |
| 100        | 599         | 50          | r            | p      | 5/ 4/29            | 27.6           | 34.7         | 8.21         | 10               | gal        |
| 100        | 602         | 100         | r            | p      | 5/ 4/29            | 27.6           | 34.7         | 8.22         | 12               | gal        |
| 101<br>101 | 603<br>604  | 0<br>50     | C<br>C       | n      | 5/ 7/29<br>5/ 7/29 | 26.3<br>26.2   | 34.7<br>34.7 | 8.24<br>8.24 | 8                | gal        |
| 101        | 605         | 100         | oc           | n<br>n | 5/ 7/29            | 25.2           | 35.1         | 8.23         | 8                | gal<br>gal |
| 101        | 606         | 0           | r            | p      | 5/ 7/29            | 26.3           | 34.7         | 8.24         | 8                | gal        |
| 101        | 607         | 50          | oc           | p      | 5/ 7/29            | 26.2           | 34.7         | 8.24         | 8                | gal        |
| 101<br>102 | 608<br>609  | 100         | r            | p<br>n | 5/ 7/29<br>5/ 9/29 | 25.2<br>25.8   | 35.1<br>35.0 | 8.23<br>8.24 | 8                | gal<br>gal |
| 102        | 610         | 50          | oc           | n      | 5/ 9/29            | 25.8           | 35.0         | 8.24         | 8                | gal        |
| 102        | 611         | 100         | . oc         | n      | 5/ 9/29            | 25.6           | 35.0         | 8.23         | 8                | gal        |
| 102<br>102 | 612         | 0<br>50     | oc           | p      | 5/ 9/29            | 25.8           | 35.0<br>35.0 | 8.24<br>8.24 | 8                | gal        |
| 102        | 613<br>614  | 100         | oc<br>oc     | p<br>p | 5/ 9/29<br>5/ 9/29 | 25.8<br>25.6   | 35.0         | 8.23         | 8                | gal<br>gal |
| 103        | 615         | 0           | oc           | n      | 5/11/29            | 26.0           | 35.0         | 8.25         | 8<br>8<br>8<br>5 | gal        |
| 103        | 616         | 50          | c            | n      | 5/11/29            | 25.8           | 35.2         | 8.25         | 5 .              | gal        |
| 103        | 617         | 100         | С            | n      | 5/11/29            | 24.8           | 35.2         | 8.25         | 5                | gal        |

Table 42. Distributional and environmental records for Ceratium macroceros--Continued

| Sample   Depth   Relative   Appa   Date   Temperature   Salinity   Depth   Poly   Sub-merging   Salinity   Depth   Cr.)   Depth   Depth   Sub-merging   Salinity   Depth   Depth   Sub-merging   Salinity   Depth   Depth   Sub-merging   Salinity   Depth   Depth   Sub-merging   Salinity   Depth   Depth   Sub-merging   Depth   Depth   Sub-merging   Depth   Depth   Depth   Sub-merging   Depth   Dept   |         |             |     |           |       |           |      |        |      |                   |         |
|--|---------|-------------|-----|-----------|-------|-----------|------|--------|------|-------------------|---------|
| C  | Station | Sample      |     | Relative  |       | Date      |      |        | Hg   | PO <sub>4</sub>   |         |
| 103  |         |             | (m) | abundance | ratus |           | (°C) | (0/00) | F    | mg/m <sup>3</sup> | species |
| 103  | 103     | 610         | - 0 | 0.0       |       | E /11 /20 | 20.0 | 25.0   | 0.05 | -                 | 1       |
| 104   621   00   0c   n   5/13/29   25.1   35.2   8.24   7   gal   104   622   50   cc   n   5/13/29   25.3   35.2   8.24   7   gal   104   622   50   cc   n   5/13/29   25.3   35.2   8.24   7   gal   104   625   50   cc   n   5/13/29   25.3   35.2   8.24   7   gal   104   625   50   cc   n   5/13/29   25.3   35.2   8.24   7   gal   104   625   50   cc   n   5/13/29   25.3   35.2   8.21   7   gal   104   626   100   r   p   5/13/29   25.3   35.2   8.21   7   gal   105   627   50   cc   n   5/15/29   26.8   34.9   8.23   5   gal   105   627   50   cc   n   5/15/29   26.8   34.9   8.23   5   gal   106   638   50   cc   n   5/15/29   25.8   34.9   8.23   5   gal   105   621   631   631   631   631   633   633   631   631   633      |         |             |     |           |       | 5/11/29   |      |        |      |                   |         |
| 104 622 500 c n 5/13/29 25.8 35.2 8.24 7 gal 104 623 100 c n 5/13/29 25.8 35.2 8.24 7 gal 104 623 100 c n 5/13/29 25.8 35.2 8.24 7 gal 104 625 100 c n 5/13/29 25.8 35.2 8.24 7 gal 105 625 100 c n 5/13/29 25.8 35.2 8.24 7 7 gal 105 627 50 c n 5/13/29 25.8 35.2 8.24 7 7 gal 105 628 50 c n 5/13/29 25.8 35.2 8.24 7 7 gal 105 628 50 c n 5/13/29 25.8 34.9 8.23 5 5 gal 105 629 100 c n 5/13/29 25.8 34.9 8.23 5 5 gal 105 630 0 r p 5/13/29 25.2 35.1 8.23 5 5 gal 105 631 0 r p 5/13/29 25.8 34.9 8.23 5 5 gal 106 633 0 r r p 5/13/29 25.8 34.9 8.23 5 5 gal 106 633 100 c n 5/13/29 25.8 34.9 8.23 5 5 gal 106 633 100 c n 5/13/29 25.6 35.1 8.23 5 5 gal 106 634 50 c n 5/13/29 27.2 33.0 8.23 5 5 gal 106 635 100 c n 5/13/29 27.2 33.0 8.23 5 5 gal 106 635 0 c r p 5/13/29 27.2 33.0 8.23 5 5 gal 106 635 0 c r p 5/13/29 27.2 33.0 8.23 5 5 gal 106 635 0 c r p 5/13/29 27.9 34.4 8.23 5 5 gal 106 636 0 c r p 5/13/29 27.9 34.4 8.23 5 5 gal 107 640 550 c n 5/13/29 27.9 34.4 8.23 5 5 gal 107 640 50 c n 5/13/29 27.9 34.4 8.23 5 5 gal 107 642 0 c c p 5/13/29 27.9 34.4 8.23 5 5 gal 107 642 0 c c n 5/13/29 28.8 34.9 8.23 5 5 gal 107 642 0 c c n 5/13/29 27.9 34.4 8.23 5 5 gal 107 644 50 c r n 5/13/29 27.9 34.4 8.23 5 5 gal 107 642 0 c c n 5/13/29 28.8 34.9 8.23 5 5 gal 107 642 0 c c n 5/13/29 28.8 34.9 8.23 1 5 gal 107 642 0 c c n 5/13/29 28.8 34.9 8.23 1 5 gal 107 642 0 c c n 5/13/29 28.8 34.9 8.23 1 1 gal 107 643 50 c r n 5/13/29 28.8 34.9 8.23 1 1 gal 107 644 50 c r n 5/13/29 28.8 34.9 8.23 1 1 gal 107 645 50 c c n 5/13/29 28.8 34.9 8.23 1 1 gal 107 640 50 c c n 5/13/29 28.8 34.9 8.23 1 1 gal 107 640 50 c n 5/13/29 28.8 34.9 8.23 1 1 gal 107 640 50 c n 5/13/29 28.8 34.9 8.23 1 1 gal 107 640 50 c n 5/13/29 28.8 34.9 8.23 1 1 gal 107 640 50 c n 5/13/29 28.8 34.9 8.23 1 1 gal 108 650 50 c n 7 p 5/13/29 28.8 34.9 8.23 1 1 gal 109 659 100 r r n p 5/13/29 28.8 35.0 8.24 4 gal 1108 669 50 c n n 5/13/29 28.8 35.0 8.25 4 gal 111 660 675 675 675 675 675 675 675 675 675 675  |         |             |     |           |       | 5/13/29   |      |        |      | 7                 |         |
| 104   623   100   c  | 104     |             |     |           |       |           |      |        |      |                   |         |
| 104   625   50   0c   p   5/13/29   25.8   35.2   8.24   7   gal   104   626   100   r   p   5/13/29   25.8   35.3   8.21   7   gal   105   627   50   0c   n   5/15/29   26.8   34.9   8.23   5   gal   105   630   100   r   p   5/15/29   26.8   34.9   8.23   5   gal   105   630   100   r   p   5/15/29   26.8   34.9   8.23   5   gal   105   631   50   r   p   5/15/29   26.8   34.9   8.23   5   gal   106   633   0c   c   n   5/15/29   26.8   34.9   8.23   5   gal   106   633   0c   c   n   5/11/29   27.2   35.0   8.23   5   gal   106   633   0c   c   n   5/11/29   27.2   35.0   8.23   5   gal   106   634   500   c   n   5/11/29   27.2   35.0   8.23   5   gal   106   638   100   c   n   5/11/29   27.2   35.0   8.23   5   gal   106   638   100   c   n   5/11/29   27.2   35.0   8.23   5   gal   106   636   636   0c   r   p   5/11/29   27.2   35.0   8.23   5   gal   106   638   100   c   n   5/11/29   27.2   35.0   8.23   5   gal   107   640   638   100   c   n   5/11/29   27.0   35.0   8.23   5   gal   107   640   50   c   n   5/11/29   27.0   35.0   8.23   5   gal   107   640   50   c   n   5/19/29   28.0   34.4   8.23   5   gal   107   643   50   c   n   5/19/29   28.0   34.4   8.23   5   gal   107   643   50   c   n   5/19/29   28.0   34.4   8.23   5   gal   107   643   50   c   n   5/19/29   28.0   34.4   8.23   5   gal   107   643   50   c   n   5/19/29   27.9   34.4   8.23   5   gal   107   644   100   r   p   5/19/29   27.9   34.4   8.23   5   gal   107   648   50   c   n   5/19/29   27.9   34.4   8.23   5   gal   107   648   50   c   n   5/19/29   27.9   34.4   8.23   5   gal   108   649   647   50   c   n   5/29/29   27.9   34.4   8.23   5   gal   109   656   100   c   n   5/29/29   27.9   34.4   8.23   5   gal   109   658   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   109   658   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   109   658   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   109   658   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   109   658   50   r   p   5/19/29     |         |             |     |           |       | 5/13/29   |      |        |      | 7                 |         |
| 104 626 100  |         |             |     |           |       |           |      |        |      |                   |         |
| 105  |         |             |     |           |       |           |      |        |      |                   | gal     |
| 105  |         |             |     |           |       |           |      |        |      | 5                 |         |
| 109 629 100 oc n 5,15,239 25,2 35,1 8,23 5 gal 105 633 50 r p 5,15,239 25,2 34,3 8,23 5 gal 106 633 50 c n p 5,15,239 25,2 34,3 8,23 5 gal 106 634 50 c n p 5,17,29 25,6 35,0 8,23 5 gal 106 635 100 c n p 5,17,29 25,6 35,1 8,23 5 gal 106 636 00 r p 5,17,29 25,6 35,1 8,23 5 gal 106 637 50 r p 5,17,29 27,0 35,0 8,23 5 gal 106 638 100 r p 5,17,29 27,0 35,0 8,23 5 gal 106 638 100 r p 5,17,29 27,0 35,0 8,23 5 gal 106 638 100 r p 5,17,29 27,0 35,0 8,23 5 gal 106 638 100 r p 5,17,29 27,0 35,0 8,23 5 gal 107 640 50 c n 5,19,29 27,0 35,0 8,23 5 gal 107 640 50 c n 5,19,29 28,0 34,4 8,23 5 gal 107 640 50 c n 5,19,29 28,0 34,4 8,23 5 gal 107 641 100 c r p 5,19,29 28,0 34,4 8,23 5 gal 107 644 100 r r p 5,19,29 28,0 34,4 8,23 5 gal 107 644 100 r r p 5,19,29 28,0 34,4 8,23 5 gal 107 644 100 r r p 5,19,29 28,0 34,4 8,23 5 gal 107 644 100 r r p 5,19,29 28,0 34,4 8,23 5 gal 107 644 100 r r p 5,19,29 28,8 34,9 8,23 11 gal 107 644 100 r p 5,19,29 28,8 34,9 8,23 11 gal 108 648 100 c n p 5,19,29 28,8 34,9 8,23 11 gal 108 648 100 c n p 5,19,29 28,8 34,9 8,23 11 gal 108 648 100 c n p 5,29,29 28,1 35,0 8,23 4 gal 108 648 100 c n p 5,29,29 28,1 35,0 8,23 4 gal 108 648 100 c n p 5,29,29 28,1 35,0 8,23 11 gal 109 655 50 r n p 5,29,29 23,1 35,0 8,22 3 gal 109 656 100 oc n p 5,29,29 23,1 35,0 8,22 3 gal 109 656 100 or n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 665 50 r n p 5,29,29 28,1 34,5 8,18 5 gal 119 676 00 r n p 6,29,29 21,7 34,5 8,29 1  | 105     | <b>62</b> 8 | 50  |           |       |           |      |        | 8.23 | 5                 |         |
| 105 631 50 r p 5/15/29 26.8 34.9 8.23 5 gal 106 633 0 c n 5/17/29 27.2 35.0 8.23 5 gal 106 634 50 c n 5/17/29 27.0 35.0 8.23 5 gal 106 635 100 c n 5/17/29 27.0 35.0 8.23 5 gal 106 635 100 c n 5/17/29 27.0 35.0 8.23 5 gal 106 635 100 c n p 5/17/29 27.0 35.0 8.23 5 gal 106 635 100 c n p 5/17/29 27.0 35.0 8.23 5 gal 106 635 100 c n p 5/17/29 27.0 35.0 8.23 5 gal 107 641 100 c n p 5/17/29 26.6 35.1 8.23 5 gal 107 641 100 c n p 5/18/29 26.8 34.4 8.23 5 gal 107 641 100 c n p 5/18/29 26.8 34.4 8.23 5 gal 107 641 100 c n p 5/18/29 26.8 34.4 8.23 5 gal 107 641 100 c n p 5/18/29 26.8 34.9 8.23 11 gal 107 643 50 r p 5/18/29 26.8 34.9 8.23 11 gal 107 644 100 r p 5/18/29 26.8 34.9 8.23 11 gal 107 644 100 r p 5/18/29 27.9 34.4 8.23 4 gal 108 644 100 r p 5/18/29 27.9 34.4 8.23 4 gal 108 644 100 r p 5/18/29 27.9 34.4 8.23 4 gal 108 645 100 c n p 5/18/29 27.9 34.4 8.23 4 gal 108 646 100 c n p 5/18/29 27.9 34.4 8.23 4 gal 108 646 100 c n p 5/18/29 27.9 34.4 8.23 11 gal 108 646 100 c n p 5/27/29 26.8 35.0 8.24 4 gal 108 660 50 r p 5/27/29 26.8 35.0 8.24 4 gal 108 660 50 r p 5/27/29 26.8 35.0 8.24 4 gal 108 660 50 r p 5/27/29 28.1 35.0 8.22 4 gal 109 656 100 oc n 5/28/29 19.4 34.8 8.18 5 gal 109 656 100 oc n 5/28/29 19.4 34.8 8.18 5 gal 109 656 100 oc n 6/3/29/29 19.4 34.8 8.18 5 gal 109 656 50 r n p 5/28/29 19.4 34.8 8.18 5 gal 111 660 60 0 r p 5/28/29 19.4 34.8 8.18 5 gal 112 676 100 r n 6/3/29/29 19.4 34.8 8.18 5 gal 112 677 0 r n 5/28/29 19.4 34.8 8.18 5 gal 112 676 100 r n 6/3/29/29 19.4 34.8 8.18 5 gal 112 676 100 r n 6/3/29/29 19.8 34.7 8.20 8 gal 112 676 100 r n 6/3/29/29 19.8 34.7 8.20 8 gal 112 676 100 r n 6/3/29/29 19.8 34.7 8.20 8 gal 112 676 100 r n 6/3/29/29 19.8 34.7 8.20 8 gal 112 676 100 r n 6/3/29/29 19.8 34.7 8.20 8 gal 112 676 100 r n 6/3/29/29 19.8 34.7 8.20 8 gal 113 684 50 0 c n 6/3/29/29 19.3 33.4 8.8 8.18 5 gal 133 684 5 0 c r n 6/3/29/29 19.3 33.4 8.8 8.20 7 gal 112 676 100 0 c n 6/3/29/29 19.3 33.4 8.8 8.20 7 gal 112 676 100 0 c n 6/3/29/29 11.8 33.1 8.1 8.20 8 gal 133 684 5 0 c r n 6/3/29/29 11.3 33.4 8 |         |             |     |           |       |           |      |        |      | 5                 |         |
| 106   633   0  |         |             |     |           |       |           |      |        |      | 5                 | gal     |
| 106   634   50   |         |             |     |           |       |           |      |        |      | 5                 | gai     |
| 106   636   0  |         |             |     |           |       |           |      |        |      | 5                 | gal     |
| 106   636   0  |         |             |     |           |       |           | 25.6 |        | 8.23 | 5                 |         |
| 106   638   100  |         |             |     |           |       |           |      |        | 8.23 | 5                 | gal     |
| 107   639   0   c   n   5/19/29   28.0   34.4   8.23   4   gal   107   641   100   oc   n   5/19/29   26.8   34.9   8.23   11   gal   107   642   0   oc   p   5/19/29   26.8   34.9   8.23   11   gal   107   643   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   107   643   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   107   643   50   r   p   5/19/29   27.9   34.4   8.23   5   gal   107   643   50   r   p   5/19/29   27.9   34.4   8.23   11   gal   108   644   50   c   n   5/27/28   26.8   35.0   8.24   4   gal   108   648   100   c   n   5/27/28   26.8   35.0   8.24   4   gal   108   649   100   c   n   5/27/28   26.8   35.0   8.24   4   gal   108   649   100   r   p   5/27/28   26.8   35.0   8.25   4   gal   109   656   50   r   p   5/27/28   26.8   35.0   8.24   4   gal   109   656   50   r   p   5/27/28   26.8   35.0   8.24   4   gal   109   656   50   r   p   5/27/28   26.8   35.0   8.25   4   gal   109   656   50   r   p   5/27/28   26.8   35.0   8.25   4   gal   109   656   50   r   p   5/27/28   23.1   35.0   8.22   3   gal   109   656   50   r   p   5/29/29   23.1   35.0   8.22   3   gal   109   656   50   r   p   5/29/29   23.1   35.0   8.22   3   gal   110   662   50   r   p   5/29/29   23.1   34.4   8.16   7   gal   111   668   0   0   0   0   0   0   0   0   0   |         |             |     |           |       |           |      |        |      | 5                 | gal     |
| 107  |         |             |     |           |       |           |      |        |      |                   | gai     |
| 107  |         |             |     |           |       |           |      |        |      |                   |         |
| 107   642   0   0c   p   5/19/29   28.0   34.4   8.23   5   gal   107   644   100   r   p   5/19/29   27.9   34.4   8.23   4   gal   107   644   100   r   p   5/19/29   26.8   34.9   8.23   11   gal   108   647   50   c   n   5/27/29   26.8   35.0   8.24   4   gal   108   648   100   c   n   5/27/29   25.2   35.0   8.23   4   gal   108   648   100   c   n   5/27/29   25.2   35.0   8.23   4   gal   108   649   0   r   p   5/27/29   25.2   35.0   8.23   4   gal   109   655   50   r   p   5/27/29   26.8   35.0   8.24   4   gal   109   655   50   r   p   5/27/29   26.1   33.8   35.0   8.24   4   gal   109   655   50   r   p   5/22/29   26.1   33.8   35.0   8.24   4   gal   109   658   50   r   p   5/22/29   23.1   35.0   8.22   3   gal   109   658   50   r   p   5/22/29   23.1   34.8   8.12   3   gal   110   662   50   r   p   5/22/29   23.1   34.8   8.18   5   gal   111   662   50   r   n   5/31/29   18.4   34.8   8.18   5   gal   111   670   100   0c   n   6/3/29   18.4   34.8   8.18   5   gal   111   670   100   0c   n   6/3/29   18.2   34.7   8.13   13   gal   111   671   0   r   p   6/3/29   20.1   34.5   8.18   5   gal   112   674   0   0c   n   6/5/29   23.2   23.4   8.23   7   gal   112   676   100   r   p   6/5/29   23.2   23.4   8.23   7   gal   112   676   100   r   p   6/5/29   23.2   23.4   8.23   7   gal   112   678   50   0c   n   6/5/29   23.2   23.4   8.23   7   gal   112   678   50   0c   n   6/5/29   23.2   23.4   8.23   7   gal   112   678   50   0c   n   6/5/29   23.2   23.4   8.23   7   gal   113   683   50   0c   n   6/25/29   23.2   23.4   8.34   8.22   7   gal   13   683   100   r   n   6/25/29   23.2   23.8   34.6   8.22   7   gal   13   683   100   r   n   6/25/29   23.2   34.6   8.22   7   gal   13   683   100   r   n   6/25/29   23.2   33.8   34.6   8.23   7   gal   13   683   100   r   n   6/25/29   24.2   33.4   8.34   8.25   5   gal   13   789   00   c   n   7/25/29   16.4   33.0   8.12   29   gal   130   787   00   r   n   6/25/29   24.2   33.4   8.34   8.34   6   gal   131   789    | 107     | 641         | 100 |           |       |           |      |        |      |                   | gal     |
| 107  |         |             |     |           |       |           |      |        |      |                   | gal     |
| 108  | 107     |             |     |           |       |           |      |        |      |                   |         |
| 108  |         |             |     |           |       |           |      |        |      |                   |         |
| 108  |         |             |     |           |       |           |      | 35.0   |      |                   |         |
| 108  | 108     |             | 0   |           |       |           |      |        |      |                   |         |
| 109  |         |             |     |           |       |           |      |        |      |                   |         |
| 109  |         |             |     |           |       |           |      |        |      | 3                 |         |
| 109  |         |             |     |           |       |           |      |        |      | 5                 |         |
| 110  |         |             |     |           |       |           |      |        |      | 5                 | gai     |
| 111  |         |             |     |           |       |           |      |        |      | 7                 | gal     |
| 1111       671       0       r       p       6/ 3/29       20.1       34.5       8.18       5       gal         112       675       50       oc       n       6/ 5/29       21.7       34.6       8.23       7       gal         112       676       100       r       n       6/ 5/29       19.8       34.7       8.20       8       gal         112       677       0       r       p       6/ 5/29       19.8       34.7       8.23       7       gal         112       6778       50       r       p       6/ 5/29       21.7       34.6       8.23       7       gal         113       681       50       oc       n       6/25/29       24.2       34.5       8.25       5       gal         113       681       50       oc       n       6/25/29       23.8       34.6       8.25       5       gal         113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/25/29       24.2       34.6       8.24       9 <td></td> <td></td> <td></td> <td>oc</td> <td>n</td> <td></td> <td></td> <td>34.5</td> <td>8.18</td> <td>5</td> <td>gal</td>   |         |             |     | oc        | n     |           |      | 34.5   | 8.18 | 5                 | gal     |
| 1112       674       0       oc       n       6/5/29       23.2       34.6       8.22       7       gal         112       675       100       r       n       6/5/29       21.7       34.6       8.23       7       gal         112       677       0       r       p       6/5/29       23.2       34.6       8.22       7       gal         113       680       0       oc       n       6/25/29       24.2       34.5       8.25       5       gal         113       680       0       oc       n       6/25/29       24.2       34.5       8.25       5       gal         113       682       100       r       n       6/25/29       21.5       34.7       8.23       8       gal         113       682       100       r       n       6/25/29       22.2       24.2       34.5       8.25       5       gal         113       683       0       oc       p       6/25/29       21.5       34.7       8.23       8       gal         114       687       50       r       n       6/25/29       21.5       34.6       8.25 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>6/ 3/29</td><td></td><td></td><td></td><td>13</td><td></td></t<>   |         |             |     |           |       | 6/ 3/29   |      |        |      | 13                |         |
| 1112       675       50       oc       n       6/5/29       21.7       34.6       8.23       7       gal         112       677       0       r       p       6/5/29       23.2       34.6       8.22       7       gal         112       678       50       r       p       6/5/29       23.2       34.6       8.23       7       gal         113       680       0       oc       n       6/25/29       24.2       34.5       8.25       5       gal         113       681       50       oc       n       6/25/29       24.2       34.5       8.25       5       gal         113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/25/29       13.2       34.6       8.25       5       ga  |         |             |     |           |       |           |      |        |      | 5                 |         |
| 1112       676       100       r       n       6/5/29       19.8       34.7       8.20       8       gal         112       676       50       r       p       6/5/29       21.7       34.6       8.23       7       gal         113       680       0       oc       n       6/25/29       21.7       34.6       8.23       7       gal         113       681       50       oc       n       6/25/29       23.8       34.6       8.25       5       gal         113       682       100       r       n       6/25/29       21.5       34.7       8.23       8       gal         113       684       50       oc       p       6/25/29       24.2       34.5       8.25       5       gal         113       684       50       oc       p       6/25/29       23.8       34.6       8.25       5       gal         114       687       50       r       n       n       7/25/29       16.4       33.0       8.12       29       gal         128       773       0       r       n       n       7/25/29       16.4       33.0   |         |             |     |           |       |           |      |        |      | 7                 | gal     |
| 1112       677       0       r       p       6/5/29       23.2       34.6       8.22       7       gal         113       680       0       oc       n       6/25/29       24.2       34.5       8.25       5       gal         113       681       50       oc       n       6/25/29       23.8       34.6       8.25       5       gal         113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.04       63       gal         128       773       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       776       0       r       p       7/25/29       16.4       33.0       8.12       29   |         |             |     |           |       |           | 19.8 |        |      | 8                 |         |
| 113 680 0 oc n 6/25/29 24.2 34.5 8.25 5 gal 113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 gal 113 682 100 r n 6/25/29 21.5 34.7 8.23 8 gal 113 683 0 oc p 6/25/29 24.2 34.5 8.25 5 gal 113 684 50 oc p 6/25/29 24.2 34.5 8.25 5 gal 114 687 50 r n 6/27/29 16.2 34.6 8.04 63 gal 128 773 0 r n 7/25/29 16.4 33.0 8.12 29 gal 128 776 0 r n 7/25/29 16.4 33.0 8.12 29 gal 128 776 0 r n 7/25/29 16.4 33.0 8.12 29 gal 128 776 0 c n 7/25/29 16.4 33.0 8.12 29 gal 129 780 0 c n 7/25/29 16.4 33.0 8.12 29 gal 129 780 0 c n 7/27/29 16.3 33.1 8.11 29 gal 130 781 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 130 788 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/6/29 19.3 33.4 8.34 36 gal 131 788 0 oc n 9/6/29 19.3 33.4 8.34 36 gal 131 789 100 oc n 9/6/29 19.3 33.4 8.34 36 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 36 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 36 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 19.3 33.4 8.34 36 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 19.3 33.4 8.34 36 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 133 805 50 r n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 133 805 50 r n 9/8/29 17.6 33.9 8.33 19 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.37 7 gal 133 806 100 r n 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.37 7 gal 134 809 50 oc n 9/12/29 22.9 34.7 8.37 7 gal 134 809 50 oc n 9/12/29 22.9 34.7 8.34 6 gal   |         |             | 0   |           | p     | 6/ 5/29   | 23.2 | 34.6   | 8.22 | 7                 |         |
| 1113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.04       63       gal         128       773       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       776       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       779       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         129       780       0       c       n       7/27/29       16.3       33.1       8.13       25       gal         130       781       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       784       0       oc       n       9/4/29       11.7       33.4       8.26       83 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>7</td><td>gal</td></td<>   |         |             |     |           |       |           |      |        |      | 7                 | gal     |
| 1113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.04       63       gal         128       773       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       776       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       779       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         129       780       0       c       n       7/27/29       16.3       33.1       8.13       25       gal         130       781       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       784       0       oc       n       9/4/29       11.7       33.4       8.26       83 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>5</td><td></td></td<>  |         |             |     |           |       |           |      |        |      | 5                 |         |
| 1113       683       0       oc       p       6/25/29       24.2       34.5       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.04       63       gal         128       773       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       776       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       779       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         129       780       0       c       n       7/27/29       16.3       33.1       8.13       25       gal         130       781       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       784       0       oc       n       9/4/29       11.7       33.4       8.26       83 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>8</td><td></td></td<>  |         |             |     |           |       |           |      |        |      | 8                 |         |
| 113       684       50       oc       p       6/25/29       23.8       34.6       8.25       5       gal         114       687       50       r       n       6/27/29       16.2       34.6       8.04       63       gal         128       774       50       r       n       7/25/29       11.8       33.1       8.11       29       gal         128       776       0       r       n       7/25/29       11.8       33.1       8.11       29       gal         128       7779       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         129       780       0       c       n       7/25/29       16.3       33.1       8.13       25       gal         130       784       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       785       50       r       p       9/4/29       11.7       33.4       8.26       83       gal         131       788       0       oc       n       9/6/29       19.3       33.4       8.34       .6       <  |         |             |     |           |       |           |      |        |      |                   |         |
| 128       773       0       r       n       7/25/29       16.4       33.0       8.12       29       gal         128       776       0       r       p       7/25/29       11.8       33.1       8.11       29       gal         128       776       0       r       p       p       7/25/29       16.4       33.0       8.12       29       gal         128       779       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         129       780       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         130       781       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       784       0       oc       p       9/4/29       16.2       33.4       8.34       36       gal         130       787       0       c       n       9/6/29       19.3       33.4       8.34       .36       gal         131       788       100       oc       n       9/6/29       19.3       33.4       8.34   |         |             |     |           |       | 6/25/29   |      |        |      | - 5               |         |
| 128       774       50       r       n       7/25/29       11.8       33.1       8.11       29       gal         128       776       0       r       p       7/25/29       16.4       33.0       8.12       29       gal         129       780       0       c       n       7/25/29       16.4       33.0       8.12       29       gal         130       781       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       784       0       oc       p       9/4/29       16.2       33.4       8.34       36       gal         130       787       0       c       n       9/4/29       16.2       33.4       8.34       36       gal         131       788       0       oc       n       9/4/29       16.2       33.4       8.34        gal         131       789       100       oc       n       9/6/29       19.3       33.4       8.34        gal         131       792       0       oc       p       9/6/29       19.3       33.4       8.34   |         |             |     |           |       |           |      |        |      |                   |         |
| 128 776 0 r p 7/25/29 16.4 33.0 8.12 29 gal 128 779 0 c n 7/25/29 16.4 33.0 8.12 29 gal 129 780 0 c n 7/27/29 16.3 33.1 8.13 25 gal 130 781 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 130 785 50 r p 9/4/29 16.2 33.4 8.34 36 gal 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/6/29 19.3 33.4 8.34 gal 131 789 100 oc n 9/6/29 19.3 33.4 8.34 gal 131 792 0 oc p 9/6/29 19.3 33.4 8.34 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 19.3 33.4 8.34 36 gal 132 798 50 r n 9/8/29 17.6 33.9 8.34 15 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 11.6 33.9 8.33 19 gal 132 801 0 r p 9/8/29 11.6 33.9 8.33 19 gal 132 802 50 r n 9/8/29 11.6 33.9 8.33 19 gal 132 803 100 oc p 9/8/29 14.3 33.4 8.30 16 gal 133 804 0 r p 9/8/29 17.6 33.9 8.33 19 gal 132 803 100 oc p 9/8/29 14.3 33.4 8.30 16 gal 133 804 0 r p 9/8/29 17.6 33.9 8.33 19 gal 133 805 50 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 22.9 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal  |         |             |     |           |       |           |      |        |      |                   |         |
| 128 779 0 c n 7/25/29 16.4 33.0 8.12 29 gal 129 780 0 c n 7/27/29 16.3 33.1 8.13 25 gal 130 781 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 130 784 0 oc p 9/4/29 16.2 33.4 8.34 36 gal 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/6/29 19.3 33.4 8.34 gal 131 789 100 oc n 9/6/29 19.3 33.4 8.32 gal 131 789 100 oc p 9/6/29 12.1 33.4 8.32 gal 131 792 0 oc p 9/6/29 19.3 33.4 8.34 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 11.7 33.4 8.34 36 gal 132 799 100 oc n 9/8/29 11.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 11.6 33.9 8.33 19 gal 132 801 0 r p 9/8/29 11.6 33.9 8.33 19 gal 132 802 50 r n 9/8/29 11.6 33.9 8.33 19 gal 132 803 100 oc n 9/8/29 11.6 33.9 8.33 19 gal 132 803 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 132 803 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 133 804 0 r n 9/8/29 17.6 33.9 8.33 19 gal 133 805 50 r n 9/8/29 17.6 33.9 8.33 19 gal 133 804 0 r n 9/8/29 17.6 33.9 8.33 19 gal 133 805 50 r n 9/10/29 22.7 34.7 8.47 7 gal 133 806 100 r n 9/8/29 14.3 33.4 8.30 16 gal 134 808 0 oc n 9/12/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 18.1 34.6 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal  |         |             |     |           |       |           |      |        |      |                   |         |
| 129       780       0       c       n       7/27/29       16.3       33.1       8.13       25       gal         130       784       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       785       50       r       p       9/4/29       11.7       33.4       8.26       83       gal         130       787       0       c       n       9/4/29       16.2       33.4       8.34       36       gal         131       788       0       oc       n       9/6/29       19.3       33.4       8.34       36       gal         131       789       100       oc       n       9/6/29       19.3       33.4       8.34        gal         131       792       0       oc       p       9/6/29       19.3       33.4       8.34        gal         131       793       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         131       795       0       r       p       9/6/29       19.3       33.4       8.34       36   | 128     |             |     |           |       | 7/25/29   |      |        |      |                   |         |
| 130       781       0       oc       n       9/4/29       16.2       33.4       8.34       36       gal         130       785       50       r       p       9/4/29       16.2       33.4       8.34       36       gal         130       787       0       c       n       9/4/29       16.2       33.4       8.34       36       gal         131       788       0       oc       n       9/6/29       19.3       33.4       8.34        gal         131       789       100       oc       n       9/6/29       19.3       33.4       8.34        gal         131       792       0       oc       p       9/6/29       19.3       33.4       8.34        gal         131       793       0       r       p       9/6/29       19.3       33.4       8.34       .36       gál         131       795       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         132       797       0       c       n       9/8/29       21.0       33.9       8.34       15 <td< td=""><td>1</td><td>780</td><td></td><td>С</td><td>n</td><td>7/27/29</td><td>16.3</td><td>33.1</td><td>8.13</td><td>25</td><td>gal</td></td<>  | 1       | 780         |     | С         | n     | 7/27/29   | 16.3 | 33.1   | 8.13 | 25                | gal     |
| 130       785       50       r       p       9/4/29       11.7       33.4       8.26       83       gal         131       788       0       oc       n       9/6/29       19.3       33.4       8.34        gal         131       789       100       oc       n       9/6/29       19.3       33.4       8.34        gal         131       792       0       oc       p       9/6/29       19.3       33.4       8.34        gal         131       793       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         131       795       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         132       797       0       c       n       9/8/29       11.0       33.9       8.34       15       gal         132       798       50       r       n       9/8/29       17.6       33.9       8.33       19       gal         132       801       0       r       p       9/8/29       14.3       33.4       8.30       16  |         |             |     |           |       | 9/4/29    |      |        |      |                   | gal     |
| 130 787 0 c n 9/4/29 16.2 33.4 8.34 36 gal 131 788 0 oc n 9/6/29 19.3 33.4 8.34 gal 131 789 100 oc n 9/6/29 12.1 33.4 8.32 gal 131 792 0 oc p 9/6/29 19.3 33.4 8.34 gal 131 793 0 r p 9/6/29 19.3 33.4 8.34 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 21.0 33.9 8.34 15 gal 132 798 50 r n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 17.6 33.9 8.33 19 gal 132 801 0 r p 9/8/29 21.0 33.9 8.34 15 gal 132 801 0 r p 9/8/29 17.6 33.9 8.33 19 gal 132 803 100 oc p 9/8/29 17.6 33.9 8.33 19 gal 132 804 0 r p 9/8/29 21.0 33.9 8.34 15 gal 133 804 0 r p 9/8/29 17.6 33.9 8.33 19 gal 133 804 0 r p 9/8/29 17.6 33.9 8.33 19 gal 133 805 50 r p 9/8/29 17.6 33.9 8.37 7 gal 133 806 100 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 18.4 34.8 8.31 7 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal   |         |             |     |           |       | 9/4/29    |      |        |      |                   |         |
| 131       788       0       oc       n       9/6/29       19.3       33.4       8.34        gal         131       789       100       oc       n       9/6/29       12.1       33.4       8.32        gal         131       792       0       oc       p       9/6/29       19.3       33.4       8.34        gal         131       793       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         131       795       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         132       797       0       c       n       9/8/29       21.0       33.9       8.34       15       gal         132       798       50       r       n       9/8/29       17.6       33.9       8.33       19       gal         132       801       0       r       p       9/8/29       17.6       33.9       8.34       15       gal         132       802       50       r       p       9/8/29       17.6       33.9       8.33       19  |         |             |     |           |       | 9/ 4/29   | 16.2 | 33.4   |      |                   |         |
| 131       789       100       oc       n       9/6/29       12.1       33.4       8.32        gal         131       792       0       oc       p       9/6/29       19.3       33.4       8.34        gal         131       793       0       r       p       9/6/29       19.3       33.4       8.34       36       gál         131       795       0       r       p       9/6/29       19.3       33.4       8.34       36       gal         132       797       0       c       n       9/8/29       21.0       33.9       8.34       15       gal         132       798       50       r       n       9/8/29       17.6       33.9       8.33       19       gal         132       799       100       oc       n       9/8/29       14.3       33.4       8.30       16       gal         132       801       0       r       p       9/8/29       17.6       33.9       8.34       15       gal         132       802       50       r       p       9/8/29       17.6       33.9       8.33       19 <td< td=""><td>131</td><td></td><td></td><td></td><td></td><td>9/6/29</td><td></td><td></td><td></td><td></td><td></td></td<>  | 131     |             |     |           |       | 9/6/29    |      |        |      |                   |         |
| 131 793 0 r p 9/6/29 19.3 33.4 8.34 36 gál 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gál 132 797 0 c n 9/8/29 21.0 33.9 8.34 15 gal 132 798 50 r n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 14.3 33.4 8.30 16 gal 132 801 0 r p 9/8/29 21.0 33.9 8.34 15 gal 132 801 0 r p 9/8/29 21.0 33.9 8.33 19 gal 132 802 50 r p 9/8/29 21.0 33.9 8.34 15 gal 132 803 100 oc p 9/8/29 17.6 33.9 8.33 19 gal 133 804 0 r p 9/8/29 17.6 33.9 8.33 19 gal 133 804 0 r n 9/10/29 22.7 34.7 8.37 7 gal 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal   |         |             |     | oc        | n     | 9/ 6/29   | 12.1 | 33.4   | 8.32 |                   | gal     |
| 131 795 0 r p 9/6/29 19.3 33.4 8.34 36 gal 132 797 0 c n 9/8/29 21.0 33.9 8.34 15 gal 132 798 50 r n 9/8/29 17.6 33.9 8.33 19 gal 132 799 100 oc n 9/8/29 14.3 33.4 8.30 16 gal 132 801 0 r p 9/8/29 21.0 33.9 8.34 15 gal 132 802 50 r p 9/8/29 21.0 33.9 8.34 15 gal 132 803 100 oc p 9/8/29 17.6 33.9 8.33 19 gal 132 803 100 oc p 9/8/29 17.6 33.9 8.33 19 gal 133 804 0 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal  | 131     |             |     |           |       | 9/ 6/29   | 19.3 |        |      |                   |         |
| 132     797     0     c     n     9/8/29     21.0     33.9     8.34     15     gal       132     798     50     r     n     9/8/29     17.6     33.9     8.33     19     gal       132     799     100     oc     n     9/8/29     14.3     33.4     8.30     16     gal       132     801     0     r     p     9/8/29     17.6     33.9     8.33     19     gal       132     802     50     r     p     9/8/29     17.6     33.9     8.33     19     gal       132     803     100     oc     p     9/8/29     17.6     33.9     8.33     19     gal       133     804     0     r     n     9/10/29     14.3     33.4     8.30     16     gal       133     805     50     r     n     9/10/29     22.7     34.7     8.47     7     gal       133     806     100     r     n     9/10/29     20.8     34.7     8.37     7     gal       134     808     0     oc     n     9/12/29     22.9     34.7     8.34     6     gal       134 <td>131</td> <td></td> <td></td> <td></td> <td></td> <td>9/ 6/29</td> <td>19.3</td> <td></td> <td></td> <td></td> <td></td>   | 131     |             |     |           |       | 9/ 6/29   | 19.3 |        |      |                   |         |
| 132     798     50     r     n     9/8/29     17.6     33.9     8.33     19     gal       132     799     100     oc     n     9/8/29     14.3     33.4     8.30     16     gal       132     801     0     r     p     9/8/29     21.0     33.9     8.34     15     gal       132     802     50     r     p     9/8/29     17.6     33.9     8.33     19     gal       132     803     100     oc     p     9/8/29     17.6     33.9     8.33     19     gal       133     804     0     r     p     9/10/29     22.7     34.7     8.47     7     gal       133     805     50     r     n     9/10/29     20.8     34.7     8.37     7     gal       133     806     100     r     n     9/10/29     20.8     34.7     8.37     7     gal       133     813     50     r     p     9/10/29     20.8     34.7     8.37     7     gal       134     808     0     oc     n     9/12/29     22.9     34.7     8.34     6     gal       134 <td></td> <td></td> <td></td> <td></td> <td></td> <td>9/8/29</td> <td></td> <td></td> <td></td> <td></td> <td></td>   |         |             |     |           |       | 9/8/29    |      |        |      |                   |         |
| 132 799 100 oc n 9/8/29 14.3 33.4 8.30 16 gal 132 801 0 r p 9/8/29 21.0 33.9 8.34 15 gal 132 802 50 r p 9/8/29 17.6 33.9 8.33 19 gal 132 803 100 oc p 9/8/29 14.3 33.4 8.30 16 gal 133 804 0 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 18.4 34.8 8.31 7 gal 133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal  | 132     |             |     |           |       | 9/ 8/29   |      |        |      |                   |         |
| 132 801 0 r p 9/8/29 21.0 33.9 8.34 15 gal 132 802 50 r p 9/8/29 17.6 33.9 8.33 19 gal 132 803 100 oc p 9/8/29 14.3 33.4 8.30 16 gal 133 804 0 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 18.4 34.8 8.31 7 gal 133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.37 7 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal  | 132     | 799         | 100 |           | n     | 9/8/29    | 14.3 | 33.4   | 8.30 | 16                |         |
| 132 803 100 oc p 9/8/29 14.3 33.4 8.30 16 gal 133 804 0 r n 9/10/29 22.7 34.7 8.47 7 gal 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal 133 806 100 r n 9/10/29 18.4 34.8 8.31 7 gal 133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 20.8 34.7 8.37 7 gal 134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal   | 132     |             |     |           |       | 9/ 8/29   |      |        | 8.34 |                   |         |
| 133 804 0 r n 9/10/29 22.7 34.7 8.47 7 gal<br>133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal<br>133 806 100 r n 9/10/29 18.4 34.8 8.31 7 gal<br>133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal<br>134 808 0 oc n 9/12/29 20.8 34.7 8.37 7 gal<br>134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal<br>134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal   |         |             |     |           | p     |           |      |        |      |                   |         |
| 133 805 50 r n 9/10/29 20.8 34.7 8.37 7 gal<br>133 806 100 r n 9/10/29 18.4 34.8 8.31 7 gal<br>133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal<br>134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal<br>134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal<br>134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal   |         |             |     |           |       |           |      |        |      |                   |         |
| 133 806 100 r n 9/10/29 18.4 34.8 8.31 7 gal<br>133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal<br>134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal<br>134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal<br>134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal  |         |             |     |           |       |           |      |        |      | 7                 |         |
| 133 813 50 r p 9/10/29 20.8 34.7 8.37 7 gal<br>134 808 0 oc n 9/12/29 22.9 34.7 8.34 6 gal<br>134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal<br>134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal  | 133     | 806         | 100 |           |       | 9/10/29   | 18.4 | 34.8   | 8.31 | 7                 |         |
| 134 809 50 oc n 9/12/29 19.8 34.6 8.34 6 gal<br>134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal  |         |             |     |           |       |           |      |        |      | 7                 |         |
| 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 gal  |         |             |     |           |       |           |      |        |      |                   |         |
|  |         |             |     |           |       |           |      |        |      |                   |         |
|  |         |             |     |           |       |           |      |        |      |                   |         |

Table 42. Distributional and environmental records for Ceratium macroceros--Continued

| Station    | Sample               | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> | Sub-<br>species |
|------------|----------------------|--------------|--------------------|----------------|----------------------|------------------|--------------------|--------------|--------------------------------------|-----------------|
|            |                      |              |                    | 1              |                      |                  |                    |              |                                      |                 |
| 134<br>135 | 817<br>820           | 100<br>0     | r<br>r             | p<br>n         | 9/12/29<br>9/14/29   | 18.1<br>23.8     | 34.6<br>35.1       | 8.34<br>8.37 | 6<br>7                               | gal<br>gal      |
| 135        | 821                  | 50           | oc                 | n              | 9/14/29              | 21.5             | 35.0               | 8.37         | 5                                    | gal             |
| 135        | 822                  | 100          | oc                 | n              | 9/14/29              | 18.7             | 34.8               | 8.34         | 5                                    | gal             |
| 135        | 824                  | 0            | r                  | p              | 9/14/29              | 23.8             | 35.1               | 8.37<br>8.37 | 7                                    | gal             |
| 135<br>135 | 825<br>826           | 50<br>100    | oc<br>r            | p<br>p         | 9/14/29<br>9/14/29   | 21.5<br>18.7     | 35.0<br>34.8       | 8.34         | 5<br>5                               | gal<br>gal      |
| 136        | 827                  | 0            | oc                 | n              | 9/16/29              | 24.6             | 35.4               | 8.37         | 3                                    | gal             |
| 136        | 828                  | 50           | oc                 | n              | 9/16/29              | 21.4             | 35.1               | 8.39         | 3                                    | gal             |
| 136<br>136 | 829<br>832           | 100<br>0     | oc                 | n<br>p         | 9/16/29<br>9/16/29   | 18.6<br>24.6     | 35.0<br>35.4       | 8.39<br>8.37 | 3                                    | gal<br>gal      |
| 136        | 833                  | 50           | r                  | p              | 9/16/29              | 21.4             | 35.1               | 8.39         | 3                                    | gal             |
| 137        | 836                  | 0            | ос                 | n              | 9/18/29              | 25.5             | 35.0               | 8.39         | 4                                    | gal             |
| 137<br>137 | 837<br>838           | 50<br>100    | oc<br>c            | n<br>n         | 9/18/29<br>9/18/29   | 24.4<br>21.5     | 35.1<br>35.1       | 8.34         | 4<br>5                               | gal<br>gal      |
| 137        | 840                  | 0            | ř                  | p              | 9/18/29              | 25.5             | 35.0               | 8.39         | 4                                    | gal             |
| 138        | 843                  | 0            | С                  | n              | 9/20/29              | 26.1             | 34.8               | 8.35         | 5                                    | gal             |
| 138<br>138 | 84 <b>4</b><br>. 845 | 50<br>100    | c<br>oc            | n<br>n         | 9/20/29 9/20/29      | 25.6<br>22.2     | 34.7<br>34.8       | 8.30<br>8.31 | 3<br>3<br>5                          | gal<br>gal      |
| 138        | 847                  | 0            | r                  | p              | 9/20/29              | 26.1             | 34.8               | 8.35         | 5                                    | gal             |
| 138        | 848                  | 50           | r                  | р              | 9/20/29              | 25.6             | 34.7               | 8.30         | 3                                    | gal             |
| 139<br>139 | 849<br>850           | 0<br>50      | oc<br>c            | n<br>n         | 9/22/29 9/22/29      | 26.7<br>25.8     | 34.8<br>34.9       | 8.34<br>8.31 | 6<br><b>6</b>                        | gal<br>gal      |
| 139        | 851                  | 100          | oc                 | n              | 9/22/29              | 22.4             | 35.2               | 8.28         | 6                                    | gal             |
| 139        | 854                  | 50           | r                  | p              | 9/22/29              | <b>25.</b> 8     | 34.9               | 8.31         | 6                                    | gal             |
| 140<br>140 | 856<br>858           | 0<br>100     | r<br>oc            | n<br>n         | 10/ 3/29<br>10/ 3/29 | 26.9<br>25.5     | 35.0<br>35.0       | 8.42<br>8.34 | 7                                    | gal<br>gal      |
| 140        | 860                  | 0            | r                  | p              | 10/ 3/29             | 26.9             | 35.0               | 8.42         | ż                                    | gal             |
| 140        | 861                  | 50           | r                  | p              | 10/ 3/29             | 26.9             | 35.0               | 8.39         | 7                                    | gal             |
| 141<br>141 | 864<br>865           | 0<br>50      | r                  | n              | 10/ 5/29<br>10/ 5/29 | 25.9<br>24.8     | 35.2<br>35.3       | 8.34<br>8.34 | 5<br>5<br>5<br>5                     | gal<br>gal      |
| 141        | 868                  | 0            | c<br>r             | n<br>p         | 10/ 5/29             | 25.9             | 35.2               | 8.34         | 5                                    | gal             |
| 141        | 869                  | 50           | r                  | p              | 10/ 5/29             | 24.8             | 35.3               | 8.34         | 5                                    | gal             |
| 141        | 870<br>872           | 50<br>0      | oc                 | P              | 10/ 5/29             | 24.8<br>24.1     | 35.3<br>34.8       | 8.34<br>8.33 | 5<br>5                               | gal<br>gal      |
| 142<br>142 | 873                  | 50           | . c                | n<br>n         | 10/ 7/29<br>10/ 7/29 | 21.8             | 34.8               | 8.30         | 5                                    | gal             |
| 142        | 874                  | 100          | С                  | n              | 10/ 7/29             | 16.6             | 34.4               | 8.27         | 7                                    | gal             |
| 142        | 876<br>878           | 100          | oc                 | p              | 10/ 7/29<br>10/ 7/29 | 24.1<br>16.6     | 34.8<br>34.4       | 8.33<br>8.27 | 5<br>7                               | gal<br>gal      |
| 142<br>143 | 881                  | 100<br>0     | r                  | p<br>n         | 10/ 9/29             | 22.4             | 34.4               | 8.30         | 6                                    | gal             |
| 143        | 882                  | 50           | ос                 | n              | 10/ 9/29             | 19.0             | 34.2               | 8.34         | 6                                    | gal             |
| 143        | 883                  | 100          | oc                 | n              | 10/9/29              | 13.8<br>23.3     | 34.1<br>35.0       | 8.30<br>8.37 | 10<br>6                              | gal<br>gal      |
| 144<br>144 | 886<br>887           | 0            | c<br>oc            | n<br>p         | 10/11/29 10/11/29    | 23.3             | 35.0               | 8.37         | 6                                    | gal             |
| 144        | 888                  | 50           | ос                 | p              | 10/11/29             | 21.1             | 34.7               | 8.33         | 6                                    | gal             |
| 144        | 889<br>890           | 100          | oc                 | p              | 10/11/29<br>10/13/29 | 16.6<br>22.3     | 34.5<br>34.6       | 8.37<br>8.29 | 6                                    | gal<br>gal      |
| 145<br>145 | 891                  | 50           | c<br>oc            | n<br>n         | 10/13/29             | 18.7             | 34.3               | 8.34         | 6                                    | gal             |
| 145        | 892                  | 100          | oc                 | n              | 10/13/29             | 16.0             | 34.1               | 8.31         | 6                                    | gal             |
| 145<br>145 | 893<br>894           | 0<br>50      | r                  | p              | 10/13/29<br>10/13/29 | 22.3<br>18.7     | 34.6<br>34.3       | 8.29<br>8.34 | 6<br>6                               | gal<br>gal      |
| 146        | 896                  | 0            | oc                 | p<br>n         | 10/15/29             | 22.4             | 34.9               | 8.37         | 6                                    | gal             |
| 146        | 897                  | 50           | oc                 | n              | 10/15/29             | 22.4             | 34.9               | 8.30         | 6                                    | gal             |
| 146<br>146 | 901<br>902           | 50<br>100    | r                  | p<br>p         | 10/15/29<br>10/15/29 | 22.4<br>19.7     | 34.9<br>34.3       | 8.30<br>8.26 | 6<br>7                               | gal<br>gal      |
| 147        | 903                  | 0            | r                  | n              | 10/17/29             | 23.3             | 35.3               | 8.26         | 8                                    | gal             |
| 147        | 904                  | 50           | oc                 | n              | 10/17/29             | 23.1             | 35.3               | 8.29         | 5<br>8                               | gal             |
| 147<br>147 | 907<br>908           | 0<br>50      | r<br>oc            | p<br>p         | 10/17/29<br>10/17/29 | 23.3<br>23.1     | 35.3<br>35.3       | 8.26<br>8.29 | 5                                    | gal<br>gal      |
| 147        | 905                  | 100          | r                  | n              | 10/17/29             | 19.2             | 35.0               | 8.29         | 5                                    | gal             |
| 148        | 910                  | 0            | oc                 |                | 10/17/29             | 23.4             | 35.2               | *****        | ***                                  | gal             |
| 148<br>148 | 911<br>912           | 50<br>100    | oc<br>oc           | n<br>n         | 10/19/29<br>10/19/29 | 23.0<br>20.0     | 35.1<br>35.0       | ****         | ***                                  | gal<br>gal      |
| 148        | 917                  | 0            | r                  | p              | 10/19/29             | 23.4             | 35.2               |              |                                      | gal             |
| 149        | 920                  |              | С                  | n              | 10/19/29             | 23.5<br>23.3     | 35.0<br>35.0       | 8.34<br>8.37 | 6<br>6                               | gal<br>gal      |
| 149<br>149 | 921<br>922           | 50<br>100    | c<br>c             | n<br>n         | 10/21/29<br>10/21/29 | 20.3             | 34.9               | 8.38         | 6                                    | gal             |
| 149        | 927                  | 0            | r                  | p              | 10/21/29             | 23.5             | 35.0               | 8.34         | 6                                    | gal             |
| 150        | 929                  | 0            | oc                 | n              | 10/23/29             | 25.6<br>22.8     | 34.7<br>34.8       | 8.39<br>8.35 | 7<br>10                              | gal<br>gal      |
| 150<br>150 | 930<br>933           | 50<br>0      | oc<br>r            | n<br>p         | 10/23/29<br>10/23/29 | 25.6             | 34.7               | 8.39         | 7                                    | gal             |
| 151        | 937                  | 0            | oc                 | n              | 10/23/29             | 26.0             | 34.0               | ••••         | ***                                  | gal             |
| 151        | 938                  | 50           | oc                 | n              | 10/26/29             | 18.3             | 34.4<br>34.0       | *****        | ***                                  | gal             |
| 151<br>151 | 941<br>942           | 0<br>50      | r                  | p<br>p         | 10/26/29<br>10/26/29 | 26.0<br>18.3     | 34.4               | *****        | ***                                  | gal             |
| 152        | 945                  | 50           | о́с                | n              | 10/27/29             | 14.2             | 34.5               | 7.87         | 53                                   | gal             |
|            |                      |              |                    |                |                      |                  |                    |              |                                      |                 |

Table 42. Distributional and environmental records for Ceratium macroceros--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO4<br>mg/m <sup>3</sup> | Sub-<br>species |
|---------|--------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------|-----------------|
| 152     | 946    | 100       |                    | _              | 10 /97 /90           | 11.4                | 24.77              | 7 70         | nc.                      | 1               |
| 152     | 949    | 50        | oc                 | n              | 10/27/29             | 11.4                | 34.7               | 7.76         | 75                       | gal             |
| 153     | 951    | 0         | oc                 | p              | 10/27/29             | 14.2                | 34.5               | 7.87         | 53<br>7                  | gal             |
| 153     | 952    | 50        | r                  | n              | 10/29/29<br>10/29/29 | 28.1                | 34.2<br>34.4       | 8.47<br>8.39 | 7                        | gal             |
| 153     | 953    | 100       | _                  | n              |                      | 28.1                |                    |              |                          | gal             |
| 153     | 956    | 50        | r                  | p              | 10/29/29             | 20.5                | 34.7               | 8.28<br>8.39 | 31                       | gal             |
| 154     | 957    | 0         | oc                 | p              | 10/29/29<br>10/29/29 | 28.1<br>28.3        | 34.4<br>34.2       | 8.39         | 7                        | gal             |
| 154     | 958    | ŏ         | oc<br>oc           | p              | 10/23/29             | 28.3                | 34.2               | 8.39         | 7                        | gal             |
| 154     | 960    | 100       | r                  | n<br>n         | 10/31/29             | 25.3                | 34.8               | 7.93         | 21                       | gal             |
| 155     | 965    | 0         | oc                 | n              | 11/ 2/29             | 27.8                | 34.9               | 8.29         | 29                       | gal             |
| 155     | 966    | 50        | r                  | n              | 11/ 2/29             | 27.7                | 34.9               | 8.30         | 30                       | gal             |
| 155     | 967    | 100       | r                  | n              | 11/ 2/29             | 27.2                | 35.0               | 8.30         | 35                       | gal             |
| 156     | 972    | 0         | r                  | n              | 11/ 4/29             | 27.6                | 35.0               | 8.34         | 28                       | gal             |
| 156     | 973    | 50        | r                  | n              | 11/ 4/29             | 27.0                | 35.1               | 8.37         | 46                       | gal<br>gal      |
| 156     | 974    | 100       | r                  | n              | 11/ 4/29             | 26.4                | 35.1               | 8.30         | 48                       |                 |
| 157     | 978    | 0         | oc                 | n              | 11/ 6/29             | 27.1                | 35.3               | 8.27         | 47                       | gal<br>gal      |
| 157     | 979    | 50        | oc                 | n              | 11/ 6/29             | 27.1                | 35.2               | 8.32         | 60                       | gal             |
| 157     | 980    | 100       | r                  | n              | 11/ 6/29             | 20.8                | 35.5               | 8.30         | 64                       | gal             |
| 158     | 983    | 0         | c                  | n              | 11/ 8/29             | 28.2                | 35.6               | 8.34         | 36                       | gal             |
| 158     | 984    | 50        | r                  | n              | 11/ 8/29             | 28,2                | 35.6               | 8.39         | 50                       | gal             |
| 158     | 985    | 100       | oc                 | n              | 11/ 8/29             | 27.6                | 35.9               | 8.39         | 48                       | gal             |
| 159     | 990    | 0         | r                  | n              | 11/11/29             | 28.6                | 35.7               | 8.37         | 15                       | gal             |
| 159     | 991    | 50        | r                  | n              | 11/11/29             | 28.5                | 35.7               | 8.39         | 15                       | gal             |
| 159     | 992    | 100       | r                  | n              | 11/11/29             | 28.0                | 35.7               | 8.37         | 23                       | gal             |
| 160     | 1002   | 50        | r                  | n              | 11/13/29             | 28.6                | 35.6               | 8.39         | 15                       | gal             |
| 160     | 1002   | 100       | r                  | n              | 11/13/29             | 28.5                | 35.7               | 8.44         | 16                       | gal             |

Abbreviations: mac-subsp. macroceros; gal-subsp. gallicum.

Table 43. Distributional and environmental records for Ceratium massiliense

| Station     | Sample        | Depth (m) | Relative abundance | Appa-<br>ratus | Date    | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> |
|-------------|---------------|-----------|--------------------|----------------|---------|---------------------|--------------------|------|--------------------------|
| 1           | 1             | 0         |                    |                | 5/12/28 | 24.0                | 36.2               | 8.16 | 34                       |
| 1           | $\frac{1}{2}$ | 70        | C                  | n              | 5/12/28 | (23.9               | 36.3               | 8.20 | 31)                      |
| 1a          | 3             | 0         | r<br>c             | n              | 5/14/28 | (22.0               | 36.3               | 8.20 | 46)                      |
| 1a          | 4             | ő         | oc                 | n<br>n         | 5/14/28 | (22.0               | 36.3               | 8.20 | 46)                      |
| 1a          | 5             | ő         | c                  | n              | 5/14/28 | (22.0               | 36.3               | 8.20 | 46)                      |
| 1a          | 6             | ő         | c                  | n              | 5/16/28 | (22.0               | 36.3               | 8.20 | 46)                      |
| 1b          | 7             | 50        | oc                 | n              | 5/16/28 | (22.0               | 36.3               | 8.20 | 46)                      |
| 1b          | 8             | 100       | c                  | n              | 5/16/28 | (22.0               | 36.3               | 8.20 | 46)                      |
|             | 13            | 100       | oc                 | n              | 5/18/28 | 19.8                | 36.4               | 8.21 | 33                       |
| 2 2         | 14            | 0         | c                  | n              | 5/18/28 | 20.5                | 36.4               | 8.23 | 58                       |
| 2           | 15            | ŏ         | r                  | n              | 5/18/28 | 20.5                | 36.4               | 8.23 | 58                       |
| 2<br>3<br>3 | 18            | 50        | oc                 | n              | 5/21/28 | 20.5                | 36.4               | 8.21 | 46                       |
| 3           | 19            | 100       | oc                 | n              | 5/21/28 | 13.6                | 35.9               | 8.10 | 48                       |
| 3           | 20            | 0         | r                  | n              | 5/21/28 | 15.5                | 36.1               | 8.15 | 99                       |
| 4           | 23            | 100       | r                  | n              | 5/23/28 | 13.4                | 35.9               | 8.12 | 50                       |
| 6c          | 47            | 100       | r                  | n              | 6/ 3/28 | (11.3               | 35.6               | 8.08 | 41)                      |
| 14          | 91            | 100       | r                  | p              | 8/ 9/28 | 14.0                | 35.6               | 8.06 | 34                       |
| 15          | 97            | 0         | oc                 | p              | 8/11/28 | 24.8                | 36.4               | 8.21 | 11                       |
| 15          | 98            | 50        | r                  | p              | 8/11/28 | 19.8                | 36.4               | 8,21 | 8                        |
| 15          | 99            | 100       | r                  | p              | 8/11/28 | 18.4                | 36.5               | 8.20 | 19                       |
| 15          | 100           | 0         | oc                 | n              | 8/11/28 | 24.8                | 36.4               | 8.21 | 11                       |
| 15          | 101           | 50        | oc                 | n              | 8/11/28 | 19.8                | 36.5               | 8.21 | 8                        |
| 15          | 102           | 100       | oc                 | n              | 8/11/28 | 18.4                | 36.4               | 8.20 |                          |
| 16          | 103           | 0         | r                  | p              | 8/13/28 | 25.9                | 36.2               | 8.24 | 8                        |
| 16          | 104           | 50        | oc                 | p              | 8/13/28 | 24.4                | 36.4               | 8.23 | 8                        |
| 16          | 106           | 0         | c                  | 'n             | 8/13/28 | 25.9                | 36.2               | 8.24 | 8                        |
| 16          | 107           | 50        | oc                 | n              | 8/13/28 | 24.4                | 36.4               | 8.23 | 8                        |
| 17          | 111           | 0         | r                  | n              | 8/15/28 | 26.2                | 36.6               | 8.29 | 9                        |
| 17          | 112           | 50        | r                  | n              | 8/15/28 | 21.9                | 36.6               | 8.28 | 12                       |
| 17          | 113           | 100       | r                  | n              | 8/15/28 | 19.3                | 36.5               | 8.23 | 9                        |
| 18          | 114           | 0         | oc                 | p              | 8/17/28 | 27.0                | 37.0               | 8.23 | 198888929555555353       |
| 18          | 116           | 100       | oc                 | p              | 8/17/28 | 20.4                | 36.8               | 8.21 | 5                        |
| 18          | 117           | 0         | c                  | 'n             | 8/17/28 | 27.0                | 37.0               | 8.23 | 5                        |
| 18          | 118           | 50        | c                  | n              | 8/17/28 | 22.4                | 36.8               | 8.24 | 5                        |
| 18          | 119           | 100       | ос                 | n              | 8/17/28 | 20.4                | 36.8               | 8.21 | 5                        |
| 20          | 125           | 0         | r                  | р              | 8/22/28 | 26.0                | 36.6               | 8.37 | 5                        |
| 20          | 126           | 50        | г                  | p              | 8/22/28 | 25.8                | 36.6               | 8.26 | 3                        |
| 20          | 128           | 0         | oc                 | 'n             | 8/22/28 | 26.0                | 36.6               | 8.37 | 5                        |
| 20          | 129           | 50        | ос                 | n              | 8/22/28 | 25.8                | 36.6               | 8.26 | 3                        |
| 20          | 130           | 100       | r                  | n              | 8/22/28 | 22.6                | 36.7               | 8.19 | 5                        |

Table 43. Distributional and environmental records for Ceratium massiliense--Continued

| Tab  | ne 43. Di  | Stributio:                      | nal and enviro                     | nmenta   | l records i  | or Ceratium m  | assiliense-  | Conti  | nued                                   |
|--|--|---------------------------------|------------------------------------|--|--|--|--|--|--|
| Station  | Sample   | Depth (m)                       | Relative abundance                 | Appa-<br>ratus   | Date   | Temperature<br>(°C)                                  | Salinity<br>(0/00)                                   | pН   | PO4<br>mg/m3                           |
| Station  20-21 21 21 21 21 21 22 22 22 22 22 22 22 2 |  | Depth                           | Relative                           | Apparatus  n p p n n n p p n n n p p n n n n p p n n n n p p n |  |  | Salinity   |  | PO <sub>4</sub>                        |
| 36<br>36   | 213<br>215   | 100                             | oc<br>r                            | n<br>p<br>n<br>n<br>n<br>n<br>n<br>n   | 10/30/28<br>10/30/28<br>10/30/28<br>11/ 1/28<br>11/ 3/28<br>11/ 6/28<br>11/ 6/28<br>11/13/28<br>11/17/28<br>11/17/28<br>11/17/28 | 26.5<br>14.4   | 31.6<br>34.9   | 8.23<br>7.85   | 16<br>149                              |
| 45<br>45<br>46<br>46<br>46<br>46<br>47               | 257<br>258<br>259<br>261<br>262<br>263<br>264<br>266 | 100<br>0<br>0<br>50<br>100<br>0 | c<br>c<br>oc<br>oc<br>c<br>r<br>oc | n<br>p<br>n<br>n<br>n  | 11/19/28<br>11/19/28<br>11/19/28<br>11/21/28<br>11/21/28<br>11/21/28<br>11/21/28<br>11/23/28                                     | 18.6<br>22.4<br>23.3<br>23.2<br>22.5<br>23.3<br>23.9 | 35.2<br>35.1<br>35.3<br>35.3<br>35.4<br>35.3<br>36.0 | 8.00<br>8.12<br>8.16<br>8.16<br>8.17<br>8.16<br>8.23 | 50<br>38<br>36<br>40<br>40<br>36<br>17 |

Table 43. Distributional and environmental records for Ceratium massiliense--Continued

| Station        | Sample     | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | рН           | PO4<br>mg/m <sup>3</sup> |
|----------------|------------|-----------|-----------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------|
| 47<br>47       | 267<br>268 | 50<br>100 | r                     | n<br>n         | 11/23/28<br>11/23/28 | 23.8<br>22.7        | 36.0<br>36.2       | 8.23<br>8.23 | 20<br>20                 |
| 48             | 271        | 0         | oc                    | n              | 11/25/28             | 23.6                | 36.4               | 8.23         | 13                       |
| 48             | 272        | 50        | С                     | n              | 11/25/28             | 23.6                | 36.4               | 8.24         | 16                       |
| 48<br>48       | 273<br>274 | 100       | c<br>oc               | n              | 11/25/28<br>11/25/28 | 22.7<br>23.6        | 36.3<br>36.4       | 8.26<br>8.23 | 16<br>13                 |
| 48             | 275        | 50        | oc                    | p<br>p         | 11/25/28             | 23.6                | 36.4               | 8.24         | 16                       |
| 49             | 277        | 0         | oc                    | n              | 11/27/28             | 23.4                | 36.2               | 8.27         | 13                       |
| 49<br>49       | 278<br>279 | 50<br>100 | r                     | n<br>n         | 11/27/28<br>11/27/28 | 22.6<br>21.6        | 36.1<br>35.9       | 8.26<br>8.26 | 13<br>13                 |
| 49             | 280        | 0         | r                     | p              | 11/27/28             | 23.4                | 36.2               | 8.27         | 13                       |
| 49             | 282        | 100       | r                     | p              | 11/27/28             | 21.6                | 35.9               | 8.26         | 13                       |
| 49a<br>50      | 283<br>284 | 0         | c<br>oc               | n<br>n         | 11/29/28<br>11/29/28 | (23.2<br>23.2       | 36.0<br>36.0       | 8.23<br>8.23 | 13)<br>13                |
| 50             | 285        | 50        | r                     | n              | 11/29/28             | 22.0                | 35.9               | 8.23         | 13                       |
| 50             | 286        | 100       | c                     | n              | 11/29/28             | 20.5                | 35.7               | 8.22         | 13                       |
| 50<br>50-51    | 287<br>290 | 0         | oc<br>c               | p<br>n         | 12/ 1/28<br>12/ 1/28 | 22.8<br>(22.8       | 35.6<br>35.6       | 8.22<br>8.22 | 16<br>16)                |
| 50-51          | 291        | 0         | oc                    | n              | 12/ 1/28             | (22.8               | 35.6               | 8.22         | 16)                      |
| 50-51<br>51    | 292<br>293 | 0         | oc                    | n              | 12/ 1/28<br>12/ 1/28 | (22.8<br>22.8       | 35.6<br>35.6       | 8.22<br>8.22 | 16)<br>16                |
| 51             | 294        | 50        | oc<br>oc              | n<br>n         | 12/ 1/28             | 20.5                | 35.6               | 8.22         | 17                       |
| 51             | 295        | 100       | ос                    | n              | 12/ 1/28             | 20.0                | 35.6               | 8.22         | 17                       |
| 52<br>52       | 299<br>300 | 0<br>50   | c<br>oc               | n<br>n         | 12/ 3/28<br>12/ 3/28 | 22.5<br>20.2        | 35.4<br>35.6       | 8.21<br>8.20 | 8                        |
| 52             | 301        | 100       | c                     | n              | 12/ 3/28             | 18.2                | 35.2               | 8.17         | 8                        |
| 52             | 302        | 0         | r                     | p              | 12/ 3/28             | 22.5                | 35.4               | 8.21         | 8                        |
| 53<br>53       | 303<br>304 | 0<br>50   | oc<br>oc              | n<br>n         | 12/ 5/28<br>12/ 5/28 | 22.6<br>21.2        | 35.7<br>35.8       | 8.22<br>8.20 | 13<br>13                 |
| 53             | 305        | 100       | oc                    | n              | 12/ 5/28             | 19.9                | 35.6               | 8.19         | 13                       |
| 53             | 306        | 0         | r                     | p              | 12/ 5/28             | 22.6                | 35.7               | 8.22         | 13                       |
| 53-54<br>53-54 | 307<br>310 | 0         | r<br>a                | n<br>n         | 12/ 6/28<br>12/10/28 | (23.0<br>(23.0      | 35.6<br>35.6       | 8.22<br>8.22 | 11)<br>11)               |
| 53-54          | 311        | 0         | oc                    | n              | 12/10/28             | (23.0               | 35:6               | 8.22         | 11)                      |
| 53-54          | 312        | 0         | c                     | n              | 12/10/28             | (23.0               | 35.6<br>35.6       | 8.22         | 11)<br>11)               |
| 53-54<br>53-54 | 313<br>316 | 0         | oc<br>r               | n<br>n         | 12/10/28<br>12/10/28 | (23.0<br>(23.0      | 35.6               | 8.22<br>8.22 | 11)                      |
| 53-54          | 317        | 0         | oc                    | n              | 12/12/28             | (23.0               | 35.6               | 8.22         | 11)                      |
| 54<br>54       | 319<br>320 | 0<br>50   | c<br>oc               | n<br>n         | 12/14/28 12/14/28    | 23.4<br>19.8        | 35.5<br>35.4       | 8.22<br>8.18 | 9<br>17                  |
| 54             | 321        | 100       | oc                    | n              | 12/14/28             | 18.7                | 35.4               | 8.16         | 20                       |
| 54             | 322        | 0         | oc                    | p              | 12/14/28             | 23.4                | 35.5               | 8.22         | 9                        |
| 55<br>55       | 323<br>324 | 0<br>50   | oc<br>oc              | n<br>n         | 12/16/28<br>12/16/28 | 20.4<br>18.7        | 34.9<br>35.0       | 8.19         | 12<br>12                 |
| 55             | 325        | 100       | oc                    | n              | 12/16/28             | 16.7                | 34.9               | 7.17         | 12                       |
| 55<br>56       | 326<br>328 | 0         | r                     | p              | 12/16/28 12/18/28    | 20.4<br>20.8        | 34.9<br>34.9       | 8.19<br>8.13 | 12                       |
| 56             | 329        | 50        | c<br>oc               | n<br>n         | 12/18/28             | 18.5                | 35.1               | 8.14         | 9                        |
| 56             | 330        | 100       | oc                    | n              | 12/18/28             | 16.6                | 34.8               | 8.11         | 12                       |
| 56<br>56       | 331<br>332 | 0<br>50   | oc<br>r               | p<br>p         | 12/18/28<br>12/18/28 | 20.8<br>18.5        | 34.9<br>35.1       | 8.13<br>8.14 | 9                        |
| 56             | 333        | 100       | r                     | p              | 12/18/28             | 16.6                | 34.8               | 8.11         | 12                       |
| 56-57          | 334        | 0         | c                     | n              | 12/19/28             | (19.0               | 34.5               | 8.14         | 20)                      |
| 57<br>57       | 335<br>336 | 50        | a<br>oc               | n<br>n         | 12/20/28 12/20/28    | 19.0<br>15.6        | 34.5<br>34.3       | 8.14         | 20                       |
| 57             | 337        | 100       | oc                    | n              | 12/20/28             | 14.3                | 34.4               | 8.10         | 40                       |
| 57<br>57       | 338<br>340 | 0<br>100  | oc<br>r               | p<br>p         | 12/20/28<br>12/20/28 | 19.0<br>14.3        | 34.5<br>34.4       | 8.14<br>8.10 | 20<br>40                 |
| 58             | 341        | 0         | oc                    | n              | 12/22/28             | 17.0                | 34.0               | 8.12         | 20                       |
| 58             | 344        | 0         | r                     | p              | 12/22/28             | 17.0                | 34.0               | 8.12         | 20                       |
| 58<br>59       | 346<br>347 | 100       | r                     | p<br>n         | 12/22/28 12/24/28    | 12.3<br>16.3        | 34.1<br>34.0       | 8.05<br>8.10 | 40<br>38                 |
| 59             | 350        | 100       | r                     | n              | 12/24/28             | 11,4                | 34.1               | 8.03         | 72                       |
| 60<br>60       | 355<br>356 | 50<br>100 | oc<br>oc              | n<br>n         | 12/26/28<br>12/26/28 | 13.4<br>10.6        | 34.0<br>34.0       | 8.06         | 54<br>62                 |
| 60             | 357        | 0         | r                     | p              | 12/26/28             | 15.0                | 34.0               | 8.07         | 50                       |
| 60             | 359        | 0         | r                     | p              | 12/26/28             | 15.0                | 34.0               | 8.07         | 50                       |
| 60-61<br>60-61 | 360<br>362 | 0         | oc<br>oc              | n<br>n         | 12/26/28 12/26/28    | (15.0<br>(15.0      | 34.0<br>34.0       | 8.07<br>8.07 | 50)<br>50)               |
| 61             | 363        | 0         | oc                    | n              | 12/28/28             | 16.9                | 34.0               | 8.05         | 46                       |
| 61-62          | 369        | 0         | r                     | n              | 12/28/28<br>12/28/28 | (16.9<br>(16.9      | 34.0<br>34.0       | 8.05<br>8.05 | 46)<br>46)               |
| 61-62<br>62    | 370<br>373 | 0<br>100  | oc<br>oc              | n<br>n         | 12/20/28             | 13.1                | 34.2               | 8.06         | 48)                      |
| 62-63          | 378        | 0         | r                     | n              | 12/31/28             | (20.5               | 34.6               | 8.07         | 21)                      |
| 63<br>63       | 379<br>380 | 0<br>50   | oc<br>r               | n<br>n         | 1/ 1/29<br>1/ 1/29   | 20.5<br>17.0        | 34.6<br>34.6       | 8.07         | 21<br>25                 |
| 00             |            | 20        | •                     | **             | -, -, -,             |                     |                    |              |                          |

Table 43. Distributional and environmental records for Ceratium massiliense--Continued

| Station          | Sample      | Depth     | Relative         | Appa-  | Date               | Temperature          | Salinity     | рН           | PO <sub>4</sub>   |
|------------------|-------------|-----------|------------------|--------|--------------------|----------------------|--------------|--------------|-------------------|
| Diacion          | Dampie      | (m)       | abundance        | ratus  | Date               | · (°C)               | (0/00)       | pn           | mg/m <sup>3</sup> |
| 63               | 381         | 100       | r                | n      | 1/ 1/29            | 15.6                 | 34.6         | 8.08         | 24                |
| 63<br>63-64      | 384<br>385  | 100       | r                | p<br>n | 1/ 1/29<br>1/ 1/29 | 15.6<br>(20.5        | 34.6<br>34.6 | 8.08<br>8.07 | 24<br>21)         |
| 63-64            | 386         | 0         | oc               | n      | 1/ 1/29            | (20.5                | 34.6         | 8.07         | 21)               |
| 63-64<br>63-64   | 387<br>388  | 0         | oc<br>oc         | n<br>n | 1/ 2/29<br>1/ 2/29 | (20.5<br>(20.5       | 34.6<br>34.6 | 8.07<br>8.07 | 21)<br>21)        |
| 63-64            | 389         | 0         | r                | n      | 1/ 2/29            | (20.5                | 34.6         | 8.07         | 21)               |
| 63-64<br>63-64   | 390<br>393  | 0         | r                | n      | 1/ 2/29<br>1/ 3/29 | (20.5<br>(20.5       | 34.6         | 8.07         | 21)               |
| 63-64            | 394         | Ö         | r                | n<br>n | 1/ 3/29            | (20.5                | 34.6<br>34.6 | 8.07<br>8.07 | 21)<br>21)        |
| 64               | 395         | 50        | r                | n      | 1/ 3/29            | 17.2                 | 34.6         | 8.12         | 29                |
| 64<br>64         | 396<br>399  | 100<br>50 | r                | n<br>p | 1/ 3/29<br>1/ 3/29 | 15.8<br>17.2         | 34.5<br>34.6 | 8.10<br>8.12 | 32<br>29          |
| 64-65            | 402         | 0         | r                | n      | 1/4/29             | (20.6                | 34.6         | 8.12         | 21)               |
| 67<br>67         | 416<br>417  | 0<br>50   | c<br>r           | n<br>n | 1/ 8/29<br>1/ 8/29 | 19.3<br>17.4         | 34.9<br>34.7 | 8.11<br>8.11 | 21<br>20          |
| 67               | 418         | 100       | oc               | n      | 1/ 8/29            | 16.2                 | 34.6         | 8.05         | 40                |
| 68<br>68         | 419<br>420  | 0<br>50   | oc<br>r          | n<br>n | 1/10/29<br>1/10/29 | 19.2<br>18.2         | 35.1<br>35.0 | 8.14<br>8.14 | 29<br>29          |
| 68               | 421         | 100       | r                | n      | 1/10/29            | 16.5                 | 34.8         | 8.13         | 34                |
| 68<br>69         | 422<br>424  | 0 .       | oc               | p      | 1/10/29<br>1/12/29 | 19.2<br>21.1         | 35.1<br>35.2 | 8.14<br>8.12 | 29<br>62          |
| 69               | 425         | 50        | oc<br>oc         | n<br>n | 1/12/29            | 17.4                 | 35.1         | 7.99         | 151               |
| 70               | 436         | 100       | r                | p      | 1/13/29            | 12.6                 | 34.8         | 7.68         | 233               |
| 71<br>74         | 441<br>456  | 0         | r<br>c           | p<br>n | 2/ 6/29<br>2/12/29 | 23.5<br>24.2         | 35.2<br>35.6 | 8.13<br>8.17 | 58<br>68          |
| 75               | 462         | 0         | oc               | n      | 2/14/29            | 22.8                 | 35.8         | 8.18         | 44                |
| 75<br>75         | 463<br>465  | 50<br>0   | oc .             | n<br>p | 2/14/29<br>2/14/29 | 20.0<br>22.8         | 35.5<br>35.8 | 8.14         | 46<br>44          |
| 76               | 467         | 0         | r                | n      | 2/16/29            | 23.4                 | 35.9         | 8.15         | 50                |
| 77<br>77         | 472<br>473  | 0         | r<br>oc          | n<br>p | 2/18/29<br>2/18/29 | 23.7<br>23.7         | 36.0<br>36.0 | 8.19<br>8.19 | 16<br>16          |
| 78               | 475         | 0         | r                | n      | 2/20/29            | 24.6                 | 36.0         | 8.17         | 32                |
| 78<br>79         | 477<br>481  | 100       | oc               | n<br>n | 2/20/29<br>2/22/29 | 21.9<br>25.2         | 36.2<br>36.0 | 8.14<br>8.17 | 34<br>34          |
| 79               | 483         | 100       | oc<br>o <b>c</b> | n      | 2/22/29            | 21.8                 | 36.2         | 8.13         | 45                |
| 79<br>80         | 484<br>486  | 0         | r                | p      | 2/22/29<br>2/24/29 | 25.2<br>26.0         | 36.0<br>35.9 | 8.17<br>8.20 | 34<br>36          |
| 80               | 487         | 50        | oc<br>r          | n<br>n | 2/24/29            | 25.9                 | 36.0         | 8.19         | 29                |
| 80<br>81         | 488         | 0         | oc               | p      | 2/24/29            | 26.0                 | 35.9<br>35.8 | 8.20         | 36<br>38          |
| 81               | 491<br>492  | 50        | oc<br>oc         | n<br>n | 2/26/29<br>2/26/29 | 26.5<br>26.4         | 35.9         | 8.19         | 38                |
| 81               | 494         | 50        | r                | p      | 2/26/29            | 26.4                 | 35.9         | 8.19         | 38                |
| 82<br>82         | 496<br>497  | 0<br>50   | c<br>oc          | n<br>n | 2/28/29<br>2/28/29 | 27.2<br>27.2         | 36.3<br>36.3 | 8.21<br>8.21 | 34<br>34          |
| 82               | 498         | - 0       | oc               | p      | 2/28/29            | 27.2                 | 36.3         | 8.21         | 34                |
| 83<br>83         | 501<br>502  | 0<br>50   | c<br>oċ          | n<br>n | 3/ 2/29<br>3/ 2/29 | 27.2<br>27.4         | 36.3<br>36.5 | 8.24<br>8.24 | 29<br>25          |
| 83               | 503         | 0         | r                | p      | 3/ 2/29            | 27.5                 | 36.3         | 8.24         | 29                |
| 8 <b>3</b><br>84 | 504<br>505  | 50<br>0   | r<br>c           | p<br>n | 3/ 2/29<br>3/ 4/29 | 27.4<br>27.8         | 36.5<br>36.2 | 8.24<br>8.23 | 25<br>24          |
| 84               | 506         | 50        | oc               | n      | 3/ 4/29            | 27.5                 | 36.4         | 8.21         | 24                |
| 85<br>85         | 510<br>511  | 50        | oc<br>oc         | n<br>n | 3/ 6/29            | 27.9<br><b>27.</b> 8 | 36.2<br>36.2 | 8.22         | 40                |
| 85               | 512         | 0         | r                | p      | 3/ 6/29            | 27.9                 | 36.2         | 8.22         | 40                |
| 86<br>86         | 515<br>516  | 0         | c<br>a           | n<br>n | 3/ 9/29<br>3/ 9/29 | (28.3<br>28.3        | 36.2<br>36.2 | 8.29<br>8.29 | 20)<br>20         |
| 86               | 517         | 50        | c                | n      | 3/ 9/29            | 27.4                 | 36.2         | 8.29         | 17                |
| 86<br>87         | 518<br>521  | 0         | oc<br>c          | p<br>n | 3/ 9/29 3/11/29    | 28.3<br>27.8         | 36.2<br>36.1 | 8.29<br>8.28 | 20<br>17          |
| 87               | 522         | 50        | oc               | n      | 3/11/29<br>3/11/29 | 26.5                 | 36.1         | 8.25         | 20                |
| 87<br>87         | 524<br>526  | 50<br>0   | r                | p      | 3/11/29<br>3/11/29 | 26.5<br>27.8         | 36.1<br>36.1 | 8.25<br>8.28 | 20<br>17          |
| 88               | 527         | 50        | oc<br>oc         | n<br>n | 3/21/29<br>3/23/29 | 28.4                 | 35.9         | 8.25         | 13                |
| 89               | <b>52</b> 8 | 0         | oc               | n      |                    | 28.4                 | 35.6         | 8.25         | 21<br>12          |
| 89<br>89         | 529<br>530  | 50<br>0   | a<br>r           | n<br>p | 3/23/29<br>3/23/29 | 28.6<br>28.4         | 35.8<br>35.6 | 8.27<br>8.25 | 21                |
| 89               | 532         | 0         | ос               | n      | 3/23/29            | (28.4                | 35.6         | 8.25         | 21)               |
| 90<br>90         | 533         | 0<br>50   | a<br>c           | n<br>n | 3/25/29<br>3/25/29 | 28.5<br>28.6         | 35.5<br>35.6 | 8.27<br>8.26 | 21<br>21          |
| 90               | 535         | 0         | ос               | p      | 3/25/29            | 28.5                 | 35.5         | 8.27         | 21                |
| 90<br>91         | 536<br>540  | 50<br>0   | oc<br>c          | p<br>n | 3/25/29<br>3/27/29 | 28.6<br>28.7         | 35.6<br>35.1 | 8.26<br>8.30 | 21<br>21          |
| 91               | 541         | 50        | a                | n      | 3/27/29            | 28.5                 | 35.2         | 8.30         | 24                |
| 91               | 542         | 0         | r                | p      | 3/27/29            | 28.7                 | 35.1<br>35.2 | 8.30<br>8.30 | 21<br>24          |
| 91               | 543         | 50        | oc               | р      | 3/27/29            | 28.5                 | 33.4         | 0.30         | 44                |

Table 43. Distributional and environmental records for Ceratium massiliense--Continued

| Station    | Sample                     | Depth (m)       | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pH           | PO <sub>4</sub> mg/m <sup>3</sup> |
|------------|----------------------------|-----------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|-----------------------------------|
| 91         | 544                        | 100             | oc                 | р              | 3/27/29            | 25.8                | 36.0               | 8.25         | 30                                |
| 92         | 545                        | 0               | c                  | n              | 3/29/29            | 28.5                | 35.3               | 8.29         | 28                                |
| 92         | 546                        | 50              | c                  | n              | 3/29/29            | 28.4                | 35.4               | 8.29         | 28                                |
| 92<br>92   | <b>54</b> 8<br><b>54</b> 9 | 50<br>100       | r                  | p              | 3/29/29<br>3/29/29 | 28.4<br>26.2        | 35.4<br>36.0       | 8.29<br>8.28 | 28                                |
| 93         | 550                        | 0               | c                  | p<br>n         | 3/31/29            | 28.7                | 34.7               | 8.30         | 28<br>28                          |
| 93         | 551                        | 50              | С                  | n              | 3/31/29            | 28.5                | 34.8               | 8.30         | 28                                |
| 95         | 563                        | 50<br>50        | c                  | n              | 4/24/29            | 29.5                | 34.9               | 8.24         | 16                                |
| 95<br>96   | 566<br>568                 | 0               | r<br>c             | p<br>n         | 4/24/29<br>4/26/29 | 29.3<br>29.3        | 34.9<br>35.3       | 8.24<br>8.23 | 16<br>12                          |
| 95         | 568A                       | 0               | r                  | n              | 4/25/29            | (29.4               | 34.7               | 8.26         | 14)                               |
| 96         | 569                        | 50              | С                  | n              | 4/26/29            | 29.2                | 35.3               | 8.23         | 12                                |
| 96<br>96   | 570<br>571                 | 100<br>0        | oc<br>oc           | n<br>p         | 4/26/29<br>4/26/29 | 28.2<br>29.3        | 35.7<br>35.3       | 8.19<br>8.23 | 25<br>12                          |
| 96         | 573                        | 100             | r                  | p              | 4/26/29            | 28.2                | 35.7               | 8.19         | 25                                |
| 97         | 574                        | 0               | С                  | n              | 4/28/29            | 28.3                | 35.2               | 8.16         | 24                                |
| 97<br>97   | 575<br>576                 | 50<br>100       | c<br>c             | n<br>n         | 4/28/29<br>4/28/29 | 28.0<br>27.0        | 35.4<br>35.6       | 8.16<br>8.15 | 21<br>25                          |
| 97         | 577                        | 0               | r                  | p              | 4/28/29            | 28.3                | 35.2               | 8.16         | 24                                |
| 97         | 578                        | 50              | oc                 | p              | 4/28/29            | 28.0                | 35.4               | 8.16         | 21                                |
| 97<br>98   | 579<br>581                 | 100             | r<br>oc            | p<br>n         | 4/28/29<br>4/30/29 | 27.6<br>27.0        | 35.6<br>35.3       | 8.15<br>8.16 | 25<br>24                          |
| 98         | 583                        | 100             | oc                 | n              | 4/30/29            | 26.7                | 35.4               | 8.14         | 32                                |
| 99         | 589                        | 0               | oc                 | n              | 5/ 2/29            | 27.9                | 34.9               | 8.21         | 12                                |
| 99<br>99   | 590<br>595                 | 50<br>0         | r                  | n              | 5/ 2/29<br>5/ 2/29 | 27.8<br>27.9        | 34.9               | 8.22<br>8.21 | 12                                |
| 100        | 596                        | 50              | oc<br>c            | n<br>n         | 5/ 2/29<br>5/ 4/29 | 27.6                | 34.9<br>34.7       | 8.21         | 12<br>10                          |
| 100        | 597                        | 100             | a                  | n              | 5/ 4/29            | 27.6                | 34.7               | 8.22         | 12                                |
| 100        | 598                        | 0               | oc                 | p              | 5/ 4/29            | 27.7                | 34.7               | 8.21         | 10                                |
| 100<br>101 | 599<br>60 <b>3</b>         | 50<br>0         | oc<br>c            | p<br>n         | 5/ 4/29<br>5/ 7/29 | 27.6<br>26.3        | 34.7<br>34.7       | 8.21<br>8.24 | 10<br>8                           |
| 101        | 604                        | 50              | c                  | n              | 5/ 7/29            | 26.2                | 34.7               | 8.24         | 8                                 |
| 101        | 605                        | 100             | С                  | n              | 5/ 7/29            | 25.2                | 35.1               | 8.23         | 8                                 |
| 101<br>102 | 606<br>609                 | 0               | r<br>c             | p<br>n         | 5/ 7/29<br>5/ 9/29 | 26.3<br>25.8        | 34.7<br>35.0       | 8.24<br>8.24 | 8                                 |
| 102        | 610                        | 50              | c                  | n              | 5/ 9/29            | <b>25.</b> 8        | 35.0               | 8.24         | 8                                 |
| 102        | 611                        | 100             | oc                 | n              | 5/ 9/29            | 25.6                | 35.0               | 8.23         | 8<br>5<br>5<br>7                  |
| 103<br>103 | 615<br>616                 | 0<br>50         | c<br>oc            | n<br>n         | 5/11/29<br>5/11/29 | 26.0<br>25.8        | 35.0<br>35.2       | 8.25<br>8.25 | 5                                 |
| 103        | 617                        | 100             | r                  | n              | 5/11/29            | 24.8                | 35.2               | 8.25         | 5                                 |
| 104        | 621                        | 0               | С                  | n              | 5/13/29            | 26.1                | 35.2               | 8.24         | 7                                 |
| 104<br>104 | 622<br>623                 | 50<br>100       | c<br>c             | n<br>n         | 5/13/29<br>5/13/29 | 25.8<br>25.3        | 35.2<br>35.3       | 8.24<br>8.21 | 7 7                               |
| 104        | 624                        | 0               | r                  | p              | 5/13/29            | 26.1                | 35.2               | 8.24         | 7                                 |
| 104        | 625                        | 50              | r                  | p              | 5/13/29            | 25.8                | 35.2               | 8.24         | 7                                 |
| 105<br>105 | 627<br>628                 | 50<br>50        | C<br>C             | n<br>n         | 5/15/29<br>5/15/29 | 26.8<br>26.8        | 34.9<br>34.9       | 8.23<br>8.23 | 5                                 |
| 105        | 630                        | 0               | oc                 | p              | 5/15/29            | 26.9                | 34.9               | 8.23         | 5                                 |
| 105        | 631                        | 50              | r                  | p              | 5/15/29            | 26.8                | 34.9               | 8.23         | 5                                 |
| 106<br>106 | 633<br>634                 | 0<br>50         | c<br>c             | n<br>n         | 5/17/29<br>5/17/29 | 27.2<br>27.0        | 35.0<br>35.0       | 8.23<br>8.23 | 75555555555                       |
| 106        | 635                        | 100             | oc                 | n              | 5/17/29            | 25.6                | 35.1               | 8.23         | 5                                 |
| 106        | 636                        | 0               | r                  | p              | 5/17/29            | 27.2                | 35.0               | 8.23         |                                   |
| 106<br>107 | 638<br>639                 | 100             | r<br>c             | p<br>n         | 5/17/29<br>5/19/29 | 25.6<br>28.0        | 35.1<br>34.4       | 8.23<br>8.23 | 5                                 |
| 107        | 640                        | 50              | c                  | n              | 5/19/29            | 27.9                | 34.4               | 8.23         | 5<br>5<br>4                       |
| 107        | 641                        | 100             | oc                 | n              | 5/19/29            | 26.8                | 34.9               | 8.23         | 11                                |
| 107<br>107 | 642<br>643                 | 0<br><b>5</b> 0 | oc<br>r            | p              | 5/19/29<br>5/19/29 | 28.0<br>27.9        | 34.4<br>34.4       | 8.23<br>8.23 | 5<br>4                            |
| 107        | 644                        | 100             | r                  | p<br>p         | 5/19/29            | 26.8                | 34.9               | 8.23         | 11                                |
| 108        | 646                        | 0               | oc                 | n              | 5/27/29            | 28.4                | 35.0               | 8.25         | 4                                 |
| 108<br>108 | 647<br>548                 | 50<br>100       | oc<br>c            | n<br>n         | 5/27/29<br>5/27/29 | 26.8<br>25.2        | 35.0<br>35.0       | 8.24<br>8.23 | 11<br>4<br>4<br>3<br>3<br>5<br>5  |
| 109        | 654                        | 0               | oc                 | n              | 5/29/29            | 27.4                | 35.0               | 8.23         | 3                                 |
| 109        | 655                        | 50              | oc                 | n              | 5/29/29            | 23.1                | 35.0               | 8.22         | 3                                 |
| 109<br>109 | 656<br>658                 | 100<br>50       | c<br>r             | n              | 5/29/29<br>5/29/29 | 19.4<br>23.1        | 34.8<br>35.0       | 8.18<br>8.22 | 3                                 |
| 110        | 661                        | 0               | a                  | p<br>n         | 5/31/29            | 23.9                | 34.7               | 8.18         | 5                                 |
| 110        | 662                        | 50              | oc                 | n              | 5/31/29            | 18.4                | 34.8               | 8.16         | 7                                 |
| 110<br>110 | 663<br>664                 | 100             | C                  | n              | 5/31/29<br>5/31/29 | 17.9<br>23.9        | 34.7<br>34.7       | 8.14<br>8.18 | 11<br>5                           |
| 110        | 666                        | 100             | c<br>r             | p              | 5/31/29            | 17.9                | 34.7               | 8.14         | 11                                |
| 111        | 668                        | 0               | c                  | n              | 6/ 3/29            | 20.1                | 34.5               | 8.18         | 5                                 |
| 111<br>111 | 669<br>671                 | 50<br>0         | oc                 | n              | 6/ 3/29 6/ 3/29    | 19.4<br>20.1        | 34.6<br>34.5       | 8.17<br>8.18 | 5<br>5<br>5                       |
| 111        | 672                        | 50              | oc<br>oc           | p<br>p         | 6/ 3/29            | 19.4                | 34.6               | 8.17         | 5                                 |

Table 43. Distributional and environmental records for Ceratium massiliense--Continued

| Station    | Sample     | Depth     | Relative     | Appa-  | Date                 | Temperature  | Salinity     | pH           | PO <sub>4</sub>                                 |
|------------|------------|-----------|--------------|--------|----------------------|--------------|--------------|--------------|---|
|            |            | (m)       | abundance    | ratus  |                      | (°C)         | (0/00)       |              | mg/m <sup>3</sup>                               |
| 112        | 675        | 50        | С            | n      | 6/ 5/29              | 21.7         | 34.6         | 8.23         | 7   |
| 112        | 676        | 100       | oc           | n      | 6/ 5/29<br>6/ 5/29   | 19.8         | 34.7         | 8.20         | 8<br>8<br>5<br>5<br>8<br>5<br>5<br>8<br>7<br>63 |
| 112        | 679        | 100       | r            | p      | 6/ 5/29              | 19.8         | 34.7         | 8.20         | 8   |
| 113        | 680        | 0         | С            | n      | 6/25/29              | 24.2         | 34.5         | 8.25         | 5   |
| 113        | 681        | 50        | oc           | n      | 6/25/29<br>6/25/29   | 23.8         | 34.6         | 8.25         | 5   |
| 113        | 682        | 100       | oc           | n      | 6/25/29              | 21.5         | 34.7         | 8.23         | 8   |
| 113        | 683        | 0         | r            | p      | 6/25/29              | 24.2<br>23.8 | 34.5         | 8.25<br>8.25 | 5   |
| 113<br>113 | 684<br>685 | 50        | oc           | p      | 6/25/29<br>6/25/29   | 21.5         | 34.6<br>34.7 | 8.23         | 9   |
| 114        | 686        | 100<br>0  | oc           | p<br>n | 6/27/29              | 19.9         | 34.3         | 8.15         | 7   |
| 114        | 687        | 50        | oc           | n      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63  |
| 114        | 689        | 0         | oc           | p      | 6/27/29<br>6/27/29   | 19.9         | 34.3         | 8.15         | 7   |
| 114        | 690        | 50        | oc           | p      | 6/27/29              | 16.2         | 34.6         | 8.04         | 63  |
| 115        | 693        | 50        | r            | n.     | 6/29/29              | 17.5         | 34.6         | 8.12         | 17  |
| 115        | 695        | 0         | r            | p      | 6/29/29              | 20.8         | 34.6         | 8.19         | 4   |
| 116        | 703        | 50        | r            | 'n     | 7/ 1/29              | 10.6         | 33.8         | 8.11         | 23  |
| 128        | 779        | 0         | С            | n      | 7/25/29              | 16.4         | 33.0         | 8.12         | 29  |
| 129        | 780        | 0         | c            | n      | 7/25/29<br>7/27/29   | 16.3         | 33.1         | 8:13         | 25  |
| 130        | 781        | 0         | oc           | n      | 9/4/29               | 16.2         | 33.4         | 8.34         | 36  |
| 130        | 782        | 50        | $\mathbf{r}$ | n      | 9/ 4/29              | 11.7         | 33.4         | 8.26         | 83  |
| 130        | 784        | 0         | ос           | p      | 9/ 4/29              | 16.2         | 33.4         | 8.34         | 36  |
| 130        | 787        | 0         | С            | n      | 9/ 4/29              | 16.2         | 33.4         | 8.34         | 36  |
| 131        | 788        | 0         | oc           | n      | 9/ 6/29              | 19.3         | 33.4         | 8.34         | 36  |
| 131        | 789        | 100       | С            | n      | 9/ 6/29<br>9/ 6/29   | 12.1         | 33.4         | 8.32         | 36  |
| 131<br>131 | 792<br>793 | 0         | oc           | p      | 9/ 6/29              | 19.3<br>19.3 | 33.4         | 8.34         | 36  |
| 132        | 797        | • 0       | r<br>c       | p      | 9/ 8/29              | 21.0         | 33.4         | 8.34<br>8.34 | 15  |
| 132        | 798        | 50        | oc           | n<br>n | 9/ 8/29              | 17.6         | 33.9<br>33.9 | 8.32         | 19  |
| 132        | 801        | 0         | oc           | p      | 9/ 8/29              | 21.0         | 33.9         | 8.34         | 15  |
| 132        | 802        | 50        | r            | p      | 9/ 8/29              |              | 33.9         | 8.33         | 19  |
| 132        | 799        | 100       | r .          | n      | 9/ 8/29              | 14.3         | 33.4         | 8.30         | 16  |
| 132        | 803        | 100       | r            | p      | 9/ 8/29              | 14.3         | 33.4         | 8.30         | 16<br>16  |
| 133        | 804        | 0         | oc           | n      | 9/10/29              | 22.7         | 34.7         | 8.47         | 7   |
| 133        | 805        | 50        | oc           | n      | 9/10/29              | 20.8         | 34.7         | 8.37         | 7   |
| 134        | 808        | 0         | oc           | n      | 9/12/29              | 22.9         | 34.7         | 8.34         | 6   |
| 134        | 809        | 50        | r            | n      | 9/12/29              | 19.8         | 34.6         | 8.34         | 6   |
| 134        | 810        | 100       | oc           | n      | 9/12/29              | 18.1         | 34.6         | 8.34         | 6   |
| 134        | 817        | 100       | r            | р      | 9/12/29              | 18.1         | 34.6         | 8.34         | 6   |
| 135        | 821        | 50        | oc           | n      | 9/14/29              | 21.5         | 35.0         | 8.37         | 5   |
| 135        | 822        | 100       | oc           | n      | 9/14/29              | 18.7         | 34.8         | 8.34         | 5   |
| 135        | 825        | 50        | $\mathbf{r}$ | р      | 9/14/29              | 21.5         | 35.0         | 8.37         | 5   |
| 135        | 826        | 100       | r            | p      | 9/14/29              | 18.7         | 34.8         | 8.34         | 5   |
| 136        | 827        | 0         | oc           | n      | 9/16/29              | 24.6         | 35.4         | 8.37         | 3   |
| 136        | 828        | 50        | C            | n      | 9/16/29              | 21.4         | 35.1         | 8.39         | 3   |
| 136        | 829<br>833 | 100       | oc           | n      | 9/16/29              | 18.6         | 35.0         | 8.39<br>8.39 | 3   |
| 136<br>136 | 834        | 50<br>100 | r            | p      | 9/16/29<br>9/16/29   | 21.4<br>18.6 | 35.1<br>35.0 | 8.39         | 3   |
| 137        | 836        | 0         | r            | p<br>n | 9/18/29              | 25.5         | 35.0         | 8.39         | 3   |
| 137        | 837        | 50        | oc           |        | 9/18/29              | 24.4         | 35.1         | 8.34         | Â   |
| 137        | 838        | 100       | c            | n<br>n | 9/18/29              | 21.5         | 35.1         | 8.30         | 7666655555333334455                             |
| 137        | 838        | 100       | r            | p      | 9/18/29              | 21.5         | 35.1         | 8.30         | 5   |
| 137        | 840        | 0         | r            | p      | 9/18/29              | 25.5         | 35.0         | 8.39         | 4   |
| 137        | 842        | 100       | r            | p      | 9/18/29              | 21.5         | 35.1         | 8.30         | 5   |
| 138        | 843        | 0         | oc           | 'n     | 9/20/29              | 26.1         | 34.8         | 8.35         | 5   |
| 138        | 844        | 50        | C            | n      | 9/20/29              | 25.6         | 34.7         | 8.30         | 5<br>3<br>3<br>6                                |
| 138        | 845        | 100       | oc           | n      | 9/20/29              | 22.2         | 34.8         | 8.31         | 3   |
| 139        | 849        | 0         | oc           | n      | 9/22/29              | 26.7         | 34.8         | 8.34         | 6   |
| 139        | 850        | 50        | С            | n      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6   |
| 139        | 851        | 100       | oc           | n      | 9/22/29              | 22.4         | 35.2         | 8.28         | 6   |
| 139        | 854        | 50        | r            | p      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6   |
| 140        | 856        | 0         | С            |        | 10/ 3/29             | 26.9         | 35.0         | 8.42         | 7   |
| 140        | 857        | 50        | oc           |        | 10/ 3/29             | 26.9         | 35.0         | 8.39         | . 7   |
| 140        | 858        | 100       | oc           | n      | 10/ 3/29             | 25.5         | 35.0         | 8.34         | 7   |
| 140        | 860        | 0         | C            |        | 10/ 3/29             | 26.9         | 35.0         | 8.42         | 7   |
| 140        | 861        | 50        | r            |        | 10/ 3/29             | 26.9         | 35.0<br>35.0 | 8.39<br>8.34 | 7   |
| 140        | 862        | 100       | r            |        | 10/ 3/29             | 25.5         |              | 8.34         | 17  |
| 140        | 863<br>864 | 100       | r            |        | 10/ 3/29             | 25.5<br>25.9 | 35.0<br>35.2 | 8.34         | 5   |
| 141<br>141 | 865        | 50        | r            |        | 10/ 5/29<br>10/ 5/29 | 24.8         | 35.2         | 8.34         | 7<br>7<br>7<br>7<br>7<br>5<br>5                 |
| 141        | 872        | 0         | oc<br>oc     |        | 10/ 3/29             | 24.0         | 34.8         | 8.33         | 5   |
| 142        | 873        | 0         | oc           |        | 10/ 7/29             | 24.1         | 34.8         | 8.33         | 5   |
| 142        | 874        | 100       | oc           | n      | 10/ 7/29             | 16.6         | 34.4         | 8.27         | 7   |
| 142        | 878        | 100       | r            |        | 10/ 7/29             | 16.6         | 34.4         | 8.27         | 7 5   |
| 143        | 881        | 0         | c            |        | 10/ 9/29             | 22.4         | 34.4         | 8.30         | 6   |
| 143        | 882        | 50        | c            |        | 10/ 9/29             | 19.0         | 34.2         | 8.34         | 6   |
|            |            |           |              |        |                      |              |              |              |   |
| 143        | 883        | 100       | С            | n      | 10/ 9/29             | 13.8         | 34.1         | 8.30         | 10  |

Table 43. Distributional and environmental records for Ceratium massiliense--Concluded

| Station           | Sample     | Depth (m) | Relative abundance | Appa<br>ratus | Date                 | Temperature (°C) | Salinity<br>(0/00) | pН           | PO4<br>mg/m3 |
|-------------------|------------|-----------|--------------------|---------------|----------------------|------------------|--------------------|--------------|--------------|
|                   |            |           |                    | -             |                      |                  | 1                  |              | -6/          |
| 143               | 885        | 50        | r                  | p             | 10/ 9/29             | 19.0             | 34.2               | 8.34         | 6            |
| 144               | 886        | 0         | oc                 | n             | 10/11/29             | 23.3             | 35.0               | 8.37         | 6            |
| 144               | 887        | Ō         | oc                 | p             | 10/11/29             | 23.3             | 35.0               | 8.37         | 6            |
| 144               | 889        | 100       | r                  | p             | 10/11/29             | 16.6             | 34.5               | 8.37         | 6            |
| 145               | 890        | 0         | r                  | n             | 10/13/29             | 22.3             | 34.6               | 8.29         | 6            |
| 145               | 891        | 50        | oc                 | n             | 10/13/29             | 18.7             | 34.3               | 8.34         | 6            |
| 145               | 892        | 100       | oc                 | n             | 10/13/29             | 16.0             | 34.1               | 8.31         | 6            |
| 145               | 893        | 0         | r                  | p             | 10/13/29             | 22.3             | 34.6               | 8.29         | 6            |
| 146               | 897        | 50        | oc                 | n             | 10/15/29             | 22.4             | 34.9               | 8.30         | 6            |
| 146               | 898        | 100       | oc                 | n             | 10/15/29             | 19.7             | 34.3               | 8.26         | 6<br>7<br>6  |
| 146               | 900        | 100       | r                  | n             | 10/15/29             | 22.4             | 34.9               | 8.37         | 6            |
| 146<br>147        | 902<br>903 | 100       | r                  | p             | 10/15/29             | 19.7             | 34.3               | 8.26         | 7            |
| 147               | 904        | 50        | oc                 | n             | 10/17/29             | 23.3             | 35.3               | 8.26         | 7<br>8<br>5  |
| 147               | 905        | 100       | c                  | n             | 10/17/29<br>10/17/29 | 23.1             | 35.3               | 8.29         | 5            |
| 147               | 908        | 50        | oc                 | n             | 10/17/29             | 19.2             | 35.0<br>35.3       |              | 5            |
| 148               | 910        | 0         | oc c               | p<br>n        | 10/11/29             | 23.1<br>23.4     | 35.2               | 8.29         |              |
| 148               | 911        | 50        | r                  | n             | 10/19/29             | 23.4             | 35.2               | *****        | ***          |
| 148               | 912        | 100       | oc                 | n             | 10/19/29             | 20.0             | 35.0               | *****        | • • •        |
| 148               | 917        | 0         | r                  | p             | 10/19/29             | 23.4             | 35.2               | 8.29         | 5            |
| 148               | 918        | 50        | r                  | p             | 10/19/29             | 23.0             | 35.1               | 8.29         | 5            |
| 149               | 920        | 0         | oc                 | n             | 10/21/29             | 23.5             | 35.0               | 8.34         | 6            |
| 149               | 921        | 50        | oc                 | n             | 10/21/29             | 23.3             | 35.0               | 8.37         | 6            |
| 149               | 922        | 100       | oc                 | n             | 10/21/29             | 20.3             | 34.9               | 8.38         | 6            |
| 150               | 929        | 0         | oc                 | n             | 10/23/29             | 25.6             | 34.7               | 8.39         | 7            |
| 150               | 930        | 50        | oc                 | n             | 10/23/29             | 22.8             | 34.8               | 8.35         | 10           |
| 150               | 931        | 100       | oc                 | n             | 10/23/29             | 19.6             | 34.6               | 8.32         | 11           |
| 151               | 937        | 0         | r                  | n             | 10/26/29             | 26.0             | 34.0               |              | ***          |
| 151               | 938        | 50        | oc                 | n             | 10/26/29             | 18.3             | 34.4               |              | ***          |
| 152               | 944        | 0         | r                  | n             | 10/27/29             | 27.4             | 33.7               | 8.35         | 20           |
| 152               | 945        | 50        | oc                 | n             | 10/27/29             | 14.2             | 34.5               | 7.87         | 53           |
| 152               | 946        | 100       | oc                 | n             | 10/27/29             | 11.4             | 34.7               | 7.76         | 75           |
| 153               | 951        | 0         | oc                 | n             | 10/29/29             | 28.1             | 34.2               | 8.47         | 7            |
| 153               | 952        | 50        | С                  | n             | 10/29/29             | 28.1             | 34.4               | 8.39         | 7            |
| 153<br>153        | 953<br>955 | 100       | oc                 | n             | 10/29/29             | 20.5             | 34.7               | 8.28         | 31           |
| 153               | 956        | 50        | r                  | p             | 10/29/29<br>10/29/29 | 28.1<br>28.1     | 34.2               | 8.47         | 7 7          |
| 154               | 958        | 0         | oc<br>c            | p<br>n        | 10/23/23             | 28.3             | 34.4<br>34.2       | 8.39<br>8.39 | 7            |
| 154               | 959        | 50        | oc                 | n             | 10/31/29             | 28.2             | 34.2               | 8.40         | 7            |
| 154               | 960        | 100       | r                  | n             | 10/31/29             | 25.3             | 34.8               | 7.93         | 21           |
| 155               | 966        | 50        | c                  | n             | 11/ 2/29             | 27.7             | 34.9               | 8.30         | 30           |
| 155               | 967        | 100       | oc                 | n             | 11/ 2/29             | 27.2             | 35.0               | 8.30         | 35           |
| 156               | 972        | 0         | oc                 | n             | 11/ 4/29             | 27.6             | 35.0               | 8.34         | 28           |
| 156               | 973        | 50        | oc                 | n             | 11/ 4/29             | 27.0             | 35.1               | 8.37         | 46           |
| 156               | 974        | 100       | oc                 | n             | 11/ 4/29             | 26.4             | 35.1               | 8.30         | 48           |
| 157               | 978        | 0         | С                  | n             | 11/ 6/29             | 27.1             | 35.3               | 8.27         | 47           |
| 157               | 979        | 50        | С                  | n             | 11/6/29              | 27.1             | 35.2               | 8.32         | 60           |
| 157               | 980        | 100       | ос                 | n             | 11/ 6/29             | 26.8             | 35.5               | 8.30         | 64           |
| 158               | 983        | 0         | С                  | n             | 11/8/29              | 28.2             | 35.6               | 8.34         | 36           |
| 158               | 984        | 50        | c                  | n             | 11/ 8/29             | 28.2             | 35.6               | 8.39         | 50           |
| 158               | 985        | 100       | oc                 | n             | 11/ 8/29             | 27.6             | 35.9               | 8.39         | 48           |
| 159               | 990        | 0         | oc                 | n             | 11/11/29             | 28.6             | 35.7               | 8.37         | 15           |
| 159               | 991        | 50        | oc                 | n             | 11/11/29             | 28.5             | 35.7               | 8.39         | 15           |
| 159<br>Donnyhn    | 992        | 100       | oc                 | n             | 11/11/29             | 28.0             | 35.7               | 8.37         | 23           |
| Penryhn<br>Island | 997        | 0         | 0.0                | **            |                      |                  |                    |              |              |
| 160               | 1000       | 0         | oc<br>oc           | n<br>n        | 11/13/29             | 28.6             | 35.6               | 8.37         | 12           |
| 160               | 1000       | 50        | oc                 | n             | 11/13/29             | 28.6             | 35.6               | 8.39         | 15           |
| 160               | 1002       | 100       | oc                 | n             | 11/15/29             | 26.0             | 36.0               | 8.33         | 23           |
| 300               | 1000       | 100       | 00                 | 11            | 11/10/20             | 20.0             | 00.0               | 0.00         | 20           |

Table 44. Distributional and environmental records for Ceratium deflexum

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 35      | 203    | 0         | С                  | n              | 10/26/28 | 27.4                | 29.7               | 8.31 | 115                                  |
| 35      | 204    | 50        | r                  | n              | 10/26/28 | 16.8                | 34.7               | 7.92 | 138                                  |
| 35      | 206    | Ö         | c                  | р              | 10/26/28 | 27.4                | 29.7               | 8.31 | 15                                   |
| 35a     | 208    | 0         | c                  | n              | 10/26/28 | (27.4               | 29.7               | 8.31 | 15)                                  |
| 35a     | 209    | 0         | С                  | n              | 10/27/28 | (27.4               | 29.7               | 8.31 | 15)                                  |
| 35-36   | 212    | 0         | С                  | n              | 10/28/28 | (27.0               | 30.7               | 8.27 | 16)                                  |
| 36      | 213    | 0         | 00                 | n              | 10/30/28 | 26.5                | 31.6               | 8.23 | 16                                   |
| 36      | 216    | 0         | r                  | р              | 10/30/28 | 26.5                | 31.6               | 8.23 | 16                                   |

Table 44. Distributional and environmental records for Ceratium deflexum--Continued

| 37   217   |         |        | 15  |              |   | 1        |       |      |      |                         |
|--|---------|--------|-----|--------------|---|----------|-------|------|------|-------------------------|
| 37 217 0 0 0   | Station | Sample |     |              |   | Date     |       |      | pН   | PO <sub>4</sub><br>mg/m |
| 37 218 50 r n 11/1/28 18.8 34.9 7.82 137 219 100 oc n 11/1/28 15.1 34.9 7.82 137 220 0 r p 11/1/28 27.1 31.7 8.28 138 224 100 r n 11/1/28 27.1 31.7 8.28 144 222 100 r n 11/1/28 26.6 34.9 7.81 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 0.00    | 017    |     |              |   |          | 07.4  | 04.5 |      |                         |
| 37 219 100 oc n 11/1/28 15.1 34.9 7.82 1 38 224 100 r n 11/3/28 15.6 34.9 7.91 1 40 223 0 r n 11/3/28 15.6 34.9 7.91 1 41 235 0 r n 11/10/28 20.4 34.2 8.0 6 41 235 0 r n 11/10/28 20.2 34.3 7. 8.2 1 42 241 0 r n 11/13/28 (18.7 34.7 8.0 6 42 242 50 r n 11/13/28 (18.7 34.7 8.0 6 42 243 100 r n 11/13/28 (18.7 34.7 8.0 6 42 244 100 r n 11/13/28 (18.7 34.7 8.0 6 43 246 100 r n 11/13/28 13.6 35.0 7.90 1 43 246 100 r n 11/15/28 13.6 35.0 7.90 1 44 250 0 r n 11/15/28 13.6 35.0 7.90 1 44 250 0 r n 11/15/28 13.6 35.0 7.90 1 44 250 0 r n 11/17/28 20.7 34.9 8.03 1 44 255 0 oc n 11/17/28 20.7 34.9 8.03 1 45 255 0 or n 11/17/28 20.4 34.9 8.04 1 46 265 50 r n 11/19/28 22.4 35.3 8.13 1 46 262 50 oc n 11/19/28 22.4 35.3 8.13 1 46 264 0 r p 11/19/28 22.4 35.3 8.16 1 46 265 50 r n 11/19/28 22.4 35.3 8.16 1 46 264 0 r p 11/12/28 23.3 35.3 8.16 1 47 266 0 r n 11/12/28 23.3 35.3 8.16 1 47 266 0 r n 11/21/28 23.3 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 3.3 35.3 8.16 1 47 266 0 r n 11/21/28 22.5 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 3.3 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 3.5 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 3.5 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 3.5 35.3 8.16 1 47 266 0 r n 11/21/28 23.2 3.5 35.3 8.16 1 47 266 0 r n 11/22/28 23.2 35.3 8.16 1 48 287 50 0 c n 11/22/28 23.2 35.3 8.16 0 61 368 100 c n 11/22/28 23.2 35.3 8.16 0 61 368 100 c n 11/22/28 23.2 35.3 8.16 0 61 368 100 c n 11/22/28 22.1 36.0 8.23 1 61 365 100 c n 11/22/28 22.2 3.6 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.7 36.2 36.0 8.23 1 61 365 100 c n 11/22/28 22.2 36.0 36.0 8.23 1 61 365 100 c n 11/22/28 22.2 36.0 36.0 8.23 1 61 365 100 c n 11/22/28 22.2 36.0 36.0 8.23 1 61 365 100 c n 11/22/28 22.2 36.0 36.0 8 |         |        |     |              |   | 11/ 1/28 | 27.1  |      |      | 15                      |
| 38   | 37      |        |     |              |   | 11/ 1/28 | 18.8  |      |      | 121                     |
| 38   | 37      |        |     |              |   | 11/ 1/20 |       |      |      | 153<br>15               |
| 40   |         |        |     |              |   | 11/ 1/40 |       |      |      | 166                     |
| 41a 24b 0 c n 11/10/28 20.4 34.2 8.11 41a 24b 0 c n 11/10/28 (18.7 34.7 8.06 42 241 0 r n 11/13/28 (18.7 34.7 8.06 42 242 50 r n 11/13/28 113.8 35.0 7.99 42 243 1000 r n 11/13/28 113.8 35.0 7.99 43 246 300 r n 11/13/28 113.8 35.0 7.99 44 247 0 r r n 11/15/28 113.6 35.0 7.99 44 247 0 r r n 11/15/28 119.6 35.0 7.99 44 250 0 r n 11/15/28 119.6 34.8 8.09 44 251 0 0 r n 11/15/28 119.6 34.8 8.09 44 253 0 0 r n 11/11/28 20.4 34.9 9.99 45 256 0 r n 11/11/28 20.4 34.9 8.03 46 250 0 r n 11/11/28 20.4 34.9 8.03 47 256 0 0 r n 11/11/28 22.4 35.2 8.13 46 261 0 0 c n 11/21/28 22.4 35.2 8.13 46 261 0 0 c n 11/21/28 23.3 35.3 8.16 46 263 100 r n 11/12/28 23.3 35.3 8.16 46 264 0 r n 11/21/28 23.2 35.3 8.16 46 265 50 r n 11/21/28 23.2 35.3 8.16 47 266 0 r n 11/21/28 23.2 35.3 8.16 48 255 50 r n 11/21/28 23.3 35.3 8.16 49 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.2 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/21/28 23.3 35.3 8.16 40 265 50 r n 11/23/28 23.8 36.0 8.23 47 266 0 r r n 11/23/28 23.8 36.0 8.23 47 267 50 0 c n 11/23/28 23.4 33.4 34.0 8.03 48 27 28 50 r n 12/23/28 22.4 33.3 35.3 8.16 61 368 100 r n 11/23/28 23.4 34.0 8.03 61 368 100 c n 1/23/28 23.8 36.0 8.23 47 47 456 0 r n 1/23/28 23.4 34.0 8.03 61 368 100 c n 1/23/28 22.7 36.6 8.17 78 476 0 c n 2/23/29 24.2 35.6 8.17 79 442 50 r n 12/23/28 22.7 36.6 8.17 79 442 50 r n 12/23/28 22.7 36.6 8.17 79 442 50 r n 12/23/28 22.7 36.0 8.17 79 442 50 r n 12/23/28 22.7 36.3 8.10 8.17 79 482 50 r n 1/23/28 22.7 36.6 8.17 79 482 50 r n 1/23/28 22.7 36.6 8.17 79 482 50 r n 1/23/28 22.7 36.6 8.17 79 544 0 r n 1/23/28 22.7 36.6 8.17 79 545 0 r n 2/23/29 24.6 36.0 8.17 79 546 0 r n 3/32/29 24.6 36.3 36.2 8.22 89 520 0 r n 3/32/29 28.5 36.3 36.2 8.22 89 520 0 r n 3/32/29 28.5 36.3 36.2 8 |         |        |     |              |   | 11/ 8/28 | 22.0  |      |      | 24                      |
| 41a 240 0 c n 11/12/28 (18.7 34.7 8.06 42 241 0 0 r n 11/13/28 17.2 34.9 7.99 42 243 100 r n 11/13/28 17.2 34.9 7.99 43 246 100 r n 11/13/28 13.8 35.0 7.90 43 247 0 r n 11/13/28 13.8 35.0 7.91 1 43 247 0 r n 11/13/28 13.8 35.0 7.90 44 251 0 oc n 11/14/28 20.7 34.9 8.03 44 251 0 oc n 11/14/28 20.7 34.9 8.03 44 253 0 oc n 11/14/28 20.7 34.9 8.03 44 255 0 r n 11/14/28 20.4 35.3 8.03 45 256 0 r n 11/14/28 22.4 35.3 8.12 46 256 0 r n 11/14/28 22.4 35.3 8.12 47 266 0 r n 11/12/28 22.4 35.3 8.16 46 262 50 oc n 11/21/28 23.3 35.3 8.16 46 263 100 r n 11/21/28 23.3 35.3 8.16 46 264 0 r p 11/21/28 23.3 35.3 8.16 47 266 0 r n 11/21/28 23.2 35.3 8.16 47 266 0 r n 11/21/28 23.2 35.3 8.16 47 267 50 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.6 38.4 8.17 48 272 50 r n 11/23/28 23.6 38.4 8.24 61 364 50 oc n 12/24/28 10.8 34.0 8.05 61 365 100 r n 12/24/29 23.8 36.0 8.23 47 268 100 oc n 12/24/28 10.8 34.0 8.05 61 365 100 c n 2/24/29 24.2 33.6 8.4 8.24 61 365 0 oc n 2/24/29 25.9 36.0 8.17 79 484 0 o c n 2/24/29 25.9 36.0 8.17 79 484 0 o c n 2/24/29 25.9 36.0 8.17 79 484 0 o c n 2/24/29 25.9 36.0 8.17 79 484 0 o c n 2/24/29 25.9 36.0 8.17 79 484 0 o c n 2/24/29 25.9 36.0 8.19 80 487 50 o c n 2/24/29 25.9 36.0 8.19 80 487 50 o c n 3/24/29 27.2 36.3 8.21 81 491 0 o c n 2/24/29 25.9 36.0 8.19 80 487 50 o c n 3/24/29 27.8 36.2 8.23 81 491 0 o c n 3/24/29 27.8 36.2 8.23 83 502 50 o c n 3/24/29 27.2 36.3 8.21 84 505 50 o c n 3/24/29 27.2 36.3 8.21 85 510 0 c n 3/24/29 27.4 36.2 8.23 86 515 0 o c n 3/24/29 27.8 36.2 8.23 87 521 0 r n 3/24/29 27.6 35.8 8.9 89 522 0 r n 3/24/29 27.6 35.3 8.23 89 528 0 r n 3/24/29 27.6 35.3 8.16 80 60 60 7 n 12/24/29 27.6 35.3 8.23 80 528 0 r |         |        |     |              |   | 11/10/28 | 20.4  |      |      | 32                      |
| 42 243 100 r n 11/13/28 17.2 34.9 7.99   43 246 100 r n 11/13/28 13.8 35.0 7.90   44 250 0 r n 11/15/28 13.6 35.0 7.90   44 251 50 oc n 11/17/28 20.7 34.9 8.03   44 255 0 oc n 11/17/28 20.7 34.9 8.03   44 255 0 oc n 11/17/28 20.4 35.3 8.04 8.04   44 255 0 oc n 11/17/28 20.4 35.2 8.03   45 257 50 oc n 11/17/28 22.4 35.3 8.16   46 263 50 oc n 11/17/28 22.4 35.3 8.16   46 263 50 oc n 11/21/28 22.4 35.3 8.16   46 263 50 oc n 11/21/28 23.2 35.3 8.16   46 264 0 r n 11/21/28 23.2 35.3 8.16   46 265 50 r n 11/21/28 23.2 35.3 8.16   47 266 0 r n 11/21/28 23.2 35.3 8.16   47 266 0 r n 11/21/28 23.2 35.3 8.16   47 268 100 oc n 11/21/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.8 36.0 8.23   47 268 100 oc n 11/23/28 23.8 36.0 8.23   47 268 100 oc n 11/23/28 23.8 36.0 8.23   47 268 100 oc n 11/23/28 23.6 38.4 8.24   48 272 50 r n 11/23/28 23.6 38.4 8.03   61 365 100 r n 12/28/28 10.8 34.0 8.05   61 365 100 r n 12/28/28 10.8 34.0 8.05   61 365 100 c n 12/28/28 10.8 34.0 8.05   61 365 100 c n 2/28/28 10.8 34.0 8.05   61 365 100 c n 2/28/28 10.8 34.0 8.03   61 366 100 c n 2/28/28 10.8 34.0 8.03   61 368 100 c n 2/28/28 10.8 34.0 8.03   61 368 100 c n 2/28/28 20.7 36.2 8.23   61 365 100 c n 2/28/28 20.9 36.0 8.17   79 484 0 r p 12/28/28 30.8 36.0 8.23   61 365 100 c n 2/28/29 25.2 36.0 8.17   79 484 0 r p 2/28/29 25.2 36.0 8.17   79 485 0 r n 12/28/28 30.8 36.0 8.17   79 486 0 r n 2/28/29 25.2 36.0 8.17   79 487 0 r n 12/28/28 30.8 36.0 8.17   79 488 0 r p 2/28/29 25.2 36.0 8.17   80 487 0 oc n 2/28/29 25.2 36.0 8.19   80 487 50 oc n 2/28/29 25.2 36.0 8.19   80 487 50 oc n 2/28/29 25.2 36.0 8.19   80 487 50 oc n 3/38/29 28.5 35.8 8.19   81 491 0 oc n 2/28/29 27.2 36.3 8.21   82 496 0 oc n 2/28/29 27.2 36.3 8.21   83 501 0 oc n 3/38/29 28.5 35.8 8.19   83 502 50 oc n 3/38/29 28.5 35.3 8.22   84 505 0 oc n 3/38/29 28.5 36.3 8.21   85 500 0 oc n 3/38/29 28.5 36.3 8.22   86 515 0 oc n 3/38/29 28.5 36.3 8.22   87 521 0 r n 3/38/29 28.5 36.3 8.23   |         |        |     |              |   | 11/12/28 |       |      |      | 45)                     |
| 42 243 100 r n 11/13/28 17.2 34.9 7.99   43 246 100 r n 11/13/28 13.8 35.0 7.90   44 250 0 r n 11/15/28 13.6 35.0 7.90   44 251 50 oc n 11/17/28 20.7 34.9 8.03   44 255 0 oc n 11/17/28 20.7 34.9 8.03   44 255 0 oc n 11/17/28 20.4 35.3 8.04 8.04   44 255 0 oc n 11/17/28 20.4 35.2 8.03   45 257 50 oc n 11/17/28 22.4 35.3 8.16   46 263 50 oc n 11/17/28 22.4 35.3 8.16   46 263 50 oc n 11/21/28 22.4 35.3 8.16   46 263 50 oc n 11/21/28 23.2 35.3 8.16   46 264 0 r n 11/21/28 23.2 35.3 8.16   46 265 50 r n 11/21/28 23.2 35.3 8.16   47 266 0 r n 11/21/28 23.2 35.3 8.16   47 266 0 r n 11/21/28 23.2 35.3 8.16   47 268 100 oc n 11/21/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.8 36.0 8.23   47 268 100 oc n 11/23/28 23.8 36.0 8.23   47 268 100 oc n 11/23/28 23.8 36.0 8.23   47 268 100 oc n 11/23/28 23.6 38.4 8.24   48 272 50 r n 11/23/28 23.6 38.4 8.03   61 365 100 r n 12/28/28 10.8 34.0 8.05   61 365 100 r n 12/28/28 10.8 34.0 8.05   61 365 100 c n 12/28/28 10.8 34.0 8.05   61 365 100 c n 2/28/28 10.8 34.0 8.05   61 365 100 c n 2/28/28 10.8 34.0 8.03   61 366 100 c n 2/28/28 10.8 34.0 8.03   61 368 100 c n 2/28/28 10.8 34.0 8.03   61 368 100 c n 2/28/28 20.7 36.2 8.23   61 365 100 c n 2/28/28 20.9 36.0 8.17   79 484 0 r p 12/28/28 30.8 36.0 8.23   61 365 100 c n 2/28/29 25.2 36.0 8.17   79 484 0 r p 2/28/29 25.2 36.0 8.17   79 485 0 r n 12/28/28 30.8 36.0 8.17   79 486 0 r n 2/28/29 25.2 36.0 8.17   79 487 0 r n 12/28/28 30.8 36.0 8.17   79 488 0 r p 2/28/29 25.2 36.0 8.17   80 487 0 oc n 2/28/29 25.2 36.0 8.19   80 487 50 oc n 2/28/29 25.2 36.0 8.19   80 487 50 oc n 2/28/29 25.2 36.0 8.19   80 487 50 oc n 3/38/29 28.5 35.8 8.19   81 491 0 oc n 2/28/29 27.2 36.3 8.21   82 496 0 oc n 2/28/29 27.2 36.3 8.21   83 501 0 oc n 3/38/29 28.5 35.8 8.19   83 502 50 oc n 3/38/29 28.5 35.3 8.22   84 505 0 oc n 3/38/29 28.5 36.3 8.21   85 500 0 oc n 3/38/29 28.5 36.3 8.22   86 515 0 oc n 3/38/29 28.5 36.3 8.22   87 521 0 r n 3/38/29 28.5 36.3 8.23   |         |        |     |              |   | 11/13/28 |       |      |      | 45)                     |
| 42 243 100 r n 11/13/28 13.8 35.0 7.90   43 247 0 r p 11/15/28 19.6 34.8 8.09   44 250 0 r n 11/17/28 20.7 34.9 8.03   44 251 50 0c n 11/17/28 20.4 34.9 8.04   45 253 0 0c n 11/17/28 20.4 34.9 8.03   45 256 0 r n 11/19/28 22.4 35.3 8.12   46 257 50 r n 11/19/28 22.4 35.3 8.12   46 259 0 oc n 11/19/28 22.4 35.3 8.12   46 259 0 oc n 11/21/28 23.3 35.3 8.12   46 250 0 c n 11/21/28 23.3 35.3 8.16   47 267 50 c n 11/21/28 23.2 35.3 8.16   48 265 50 r p 11/21/28 23.3 35.3 8.16   47 266 0 r p 11/21/28 23.3 35.3 8.16   47 267 268 0 0 c n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.9 36.0 8.23   47 268 100 oc n 11/23/28 23.4 36.0 8.23   48 272 50 r n 11/23/28 23.4 36.0 8.23   47 366 100 oc n 11/23/28 23.4 36.0 8.23   48 272 50 r n 11/23/28 23.4 36.0 8.23   48 272 50 r n 11/23/28 23.8 36.0 8.23   47 366 100 oc n 11/23/28 23.4 36.0 8.23   48 272 50 r n 11/23/28 23.6 36.4 8.24   61 365 100 oc n 12/28/28 10.8 34.0 8.05   61 366 100 r n 12/28/28 10.8 34.0 8.05   61 366 0 r n 12/28/28 10.8 34.0 8.05   61 366 0 r n 12/28/28 10.8 34.0 8.05   61 366 0 r n 12/28/28 24.6 36.0 8.17   78 477 100 oc n 12/28/28 25.9 36.0 8.17   78 478 0 oc n 2/20/29 24.6 36.0 8.17   78 478 0 oc n 2/20/29 24.6 36.0 8.17   79 484 0 r p 2/22/29 25.2 36.0 8.17   79 484 0 r p 2/22/29 25.2 36.0 8.17   79 484 0 r p 2/22/29 25.2 36.0 8.17   79 484 0 r p 2/22/29 25.2 36.0 8.17   79 485 0 c n 3/29/29 24.5 36.8 8.17   79 486 0 r n 2/28/29 27.2 36.3 8.19   80 487 50 r n 2/28/29 27.2 36.3 8.19   80 487 50 r n 2/28/29 27.2 36.3 8.19   80 487 50 r n 3/29/29 24.5 36.8 8.17   80 486 0 oc n 2/20/29 24.6 36.0 8.17   80 486 0 r n 2/28/29 27.8 36.2 8.23   81 491 0 oc n 2/28/29 25.2 36.0 8.17   80 486 0 r n 3/29/29 28.5 36.0 8.19   80 487 50 r n 3/29/29 28.5 36.0 8.19   80 488 0 r n 2/28/29 27.8 36.2 8.23   81 491 0 oc n 2/28/29 27.8 36.2 8.23   81 50 0 c n 3/4/29 27.8 36.2 8.23   82 50 0 r n 3/4/29 27.8 36.2 8.23   83 550 0 c n 3/4/29 27.8 36.2 8.23   83 550 0 c n 3/3/29 28.5 35.3 36.3 8.29   83 550 0 c n 3/3/29 28.5 35. |         |        | 50  |              |   | 11/13/28 |       |      |      | 68                      |
| 43   | 42      | 243    |     |              | n | 11/13/28 |       | 35.0 | 7.91 | 150                     |
| 44 250 0 r p 11/15/28 19.6 34.8 8.09 44 251 50 0 c n 11/17/28 20.7 34.9 8.03 44 253 0 oc n 11/17/28 20.4 34.9 8.04 45 256 0 r n 11/17/28 20.4 34.9 8.03 45 256 0 r n 11/19/28 22.4 35.3 8.12 45 257 50 r n 11/19/28 22.4 35.3 8.12 46 261 0 oc n 11/21/28 23.3 35.3 8.16 46 262 50 oc n 11/21/28 23.3 35.3 8.16 46 263 100 r n 11/21/28 23.2 33.3 35.3 8.16 46 264 0 r n 11/21/28 23.2 35.3 8.16 47 266 0 r n 11/21/28 23.2 35.3 8.16 47 266 0 r n 11/21/28 23.2 35.3 8.16 47 266 0 r n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.8 36.0 8.23 48 272 50 r n 11/23/28 23.6 36.4 8.24 61 364 50 oc n 12/28/28 10.8 34.0 8.05 61 365 100 r n 12/28/28 10.8 34.0 8.05 61 365 100 r n 12/28/28 10.8 34.0 8.05 61 366 100 r n 12/28/28 10.8 34.0 8.03 61 368 100 r n 12/28/28 31.9 36.0 8.23 74 456 o r n 12/28/28 10.8 34.0 8.03 61 368 100 c n 12/28/28 10.8 34.0 8.03 61 368 100 c n 12/28/28 30.8 34.0 8.03 61 368 100 c n 12/28/28 30.8 34.0 8.03 61 368 0 0 c n 2/20/29 24.2 35.6 8.17 78 475 0 oc n 2/20/29 24.5 35.6 8.17 78 477 100 oc n 2/20/29 24.5 35.6 8.17 78 477 0 0 oc n 2/20/29 24.5 35.6 8.17 78 478 0 oc n 2/20/29 25.3 6.0 35.9 8.20 78 487 50 r n 2/22/29 24.5 36.1 8.17 78 487 0 oc n 2/20/29 25.3 6.0 35.9 8.20 80 488 0 r p 2/24/29 25.5 36.1 8.17 80 486 0 oc n 2/20/29 25.5 36.0 8.17 80 486 0 r p 2/24/29 26.5 35.9 8.20 81 491 0 oc n 2/28/29 27.2 36.3 8.21 81 491 0 oc n 2/28/29 27.2 36.3 8.21 82 495 0 oc n 3/2/29/29 24.5 36.1 8.19 80 488 0 r p 2/24/29 26.5 35.9 8.20 81 491 0 oc n 2/28/29 27.2 36.3 8.21 82 495 0 oc n 3/2/29/29 24.5 36.0 35.9 8.20 83 551 0 oc n 3/2/29/29 24.5 36.0 8.23 84 507 0 r n 3/2/29/29 24.5 36.0 8.23 85 510 0 oc n 3/2/29/29 24.5 36.0 8.23 86 515 0 oc n 3/2/29/29 24.5 36.0 8.29 87 521 0 r n 3/2/29/29 24.5 36.0 8.29 88 522 0 r n 3/2/29/29 24.5 36.0 8.29 89 532 0 r n 3/2/29/29 24.6 36.0 8.29 89 532 0 r n 3/2/29/29 24.5 36.0 8.29 89 532 0 r n 3/2/29/29 26.2 36.0 8.29 90 549 100 r p 3/2/29/29 26.2 36.0 8.29 91 540 0 oc n 3/2/29/29 27.6 36.0 8.29 91 540 0 oc n 3/2/29/29 28.5 35.9 8.20 91 540 0  | 43      | 246    | 100 | <b>r</b> -   | n | 11/15/28 | 13.6  | 35.0 | 7.90 | 92                      |
| 44   |         |        |     | $\mathbf{r}$ | р |          |       |      |      | 52                      |
| 44 253 0 oc p 11/17/28 20.7 34.9 8.03 45 256 0 r n 11/19/28 22.4 35.3 8.12 45 257 50 r n 11/19/28 22.4 35.3 8.12 46 261 0 oc n 11/21/28 23.3 35.3 8.16 46 262 50 oc n 11/21/28 23.3 35.3 8.16 46 263 100 r n 11/21/28 23.3 35.3 8.16 46 264 0 r n 11/21/28 23.3 35.3 8.16 46 265 50 r n 11/21/28 23.3 35.3 8.16 47 266 0 r n 11/21/28 23.3 35.3 8.16 47 267 50 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 47 268 100 oc n 11/23/28 23.9 36.0 8.23 48 272 50 r n 11/25/28 23.6 36.4 8.24 61 364 50 oc n 12/28/28 10.8 34.0 8.05 61 368 100 r n 12/28/28 10.8 34.0 8.05 61 368 100 r n 12/28/28 10.8 34.0 8.03 62 372 50 r n 12/28/28 10.8 34.0 8.03 62 372 50 r n 12/28/28 10.8 34.0 8.03 62 47 48 60 r n 12/28/29 24.2 35.6 8.17 78 475 0 oc n 2/20/29 24.6 36.0 8.17 78 476 0 or n 2/20/29 24.6 36.0 8.17 78 477 100 oc n 2/20/29 24.6 36.0 8.17 79 484 0 r p 2/22/29 25.2 36.0 8.17 79 484 0 or p 2/20/29 24.6 36.0 8.17 79 484 0 or p 2/20/29 24.6 36.0 8.17 79 484 0 r p 2/22/29 25.5 36.0 8.17 79 484 0 or p 2/20/29 24.6 36.0 8.17 79 484 0 or p 2/20/29 24.6 36.0 8.17 79 484 0 or p 2/20/29 24.6 36.0 8.17 79 484 0 or p 2/20/29 24.6 36.0 8.17 79 484 0 or n 2/22/29 25.2 36.0 8.17 80 486 0 or n 2/20/29 24.6 36.0 8.17 81 491 0 oc n 2/20/29 24.6 36.0 8.17 80 486 0 or n 2/20/29 24.6 36.0 8.17 81 491 0 oc n 2/20/29 24.6 36.0 8.17 82 498 0 r n 2/22/29 25.2 36.0 8.19 80 487 50 r n 2/24/29 25.9 36.0 8.19 80 488 0 r n 2/24/29 25.9 36.0 8.19 80 487 50 or n 3/24/29 27.5 36.3 8.20 81 491 0 oc n 3/24/29 27.5 36.3 8.20 81 491 0 or n 3/24/29 27.5 36.3 8.21 82 496 0 or n 3/24/29 27.5 36.3 8.20 83 502 50 or n 3/24/29 27.5 36.3 8.20 84 505 0 or n 3/24/29 28.3 36.0 8.21 83 502 50 or n 3/24/29 27.5 36.3 8.20 84 506 50 or n 3/24/29 27.5 36.3 8.21 83 502 50 or n 3/24/29 27.5 36.3 8.20 84 506 50 or n 3/24/29 27.5 36.3 8.20 85 510 0 or n 3/24/29 27.5 36.3 8.20 86 516 0 or n 3/24/29 27.5 36.3 36.2 8.22 87 520 0 or n 3/24/29 27.5 36.3 36.2 8.23 88 526 0 r n n 5/15/29 26.8 34.9 8.23 89 532 0 or n 3/24/29 27.5 36.5 35.3 8.29 89 532 0 or n n 5/15/29 26.8 34.9 8.2 |         |        |     |              |   | 11/17/28 |       |      |      | 38                      |
| 45   |         |        |     |              |   | 11/17/28 |       |      |      | 34                      |
| 45   |         |        |     |              |   |          |       |      |      | 38                      |
| 46   |         |        |     |              |   | 11/19/28 |       |      |      | 38                      |
| 46   |         |        |     |              |   | 11/19/28 |       |      |      | 46<br>38                |
| 46   |         |        |     |              |   | 11/19/20 |       |      |      | 36                      |
| 46   |         |        |     |              |   | 11/21/20 |       |      |      | 40                      |
| 466  |         |        |     |              |   |          |       |      |      | 40                      |
| 46   |         |        |     |              |   | 11/21/20 |       |      |      | 36                      |
| 47   |         | 265    |     |              |   | 11/21/28 | 23.2  |      |      | 40                      |
| 47 268 100 oc n 11/23/28 23.8 36.0 8.23 48 272 50 r n 11/25/28 23.6 36.4 8.24 61 365 100 c n 12/28/28 11.0 8 34.0 8.05 61 365 100 c n 12/28/28 10.8 34.0 8.03 61 368 100 r p 12/28/28 10.8 34.0 8.03 61 368 100 oc n 12/28/28 10.8 34.0 8.03 61 368 100 oc n 12/28/28 10.8 34.0 8.03 61 368 100 oc n 12/28/28 10.8 34.0 8.03 61 368 100 oc n 12/28/28 10.8 34.0 8.03 61 368 100 oc n 12/28/28 10.8 34.0 8.03 61 368 100 oc n 12/28/28 10.8 34.0 8.03 62 372 50 r n 12/30/28 16.2 34.3 8.10 74 456 0 r n 2/12/29 24.2 35.6 8.17 78 477 100 oc n 2/20/29 24.6 36.0 8.17 78 478 0 oc p 2/20/29 24.6 36.0 8.17 79 482 50 r n 2/20/29 24.5 36.1 8.17 79 482 50 r n 2/22/29 24.5 36.1 8.17 80 486 0 oc n 2/24/29 26.0 35.9 8.20 80 487 50 r n 2/24/29 26.0 35.9 8.20 81 491 0 oc n 2/26/29 26.5 35.8 8.19 80 488 0 r n 2/26/29 26.5 35.8 8.19 81 491 0 oc n 2/26/29 26.5 35.8 8.19 82 498 0 r n 2/26/29 27.2 36.3 8.21 82 498 0 r n 2/28/29 27.2 36.3 8.21 82 498 0 r n 2/28/29 27.2 36.3 8.21 83 502 50 oc n 2/28/29 27.2 36.3 8.21 83 502 50 oc n 3/2/29 27.5 36.3 8.21 83 501 0 c n 3/2/29 27.5 36.3 8.21 83 502 50 oc n 3/2/29 27.5 36.3 8.21 84 506 50 oc n 3/2/29 27.5 36.2 8.23 84 506 50 oc n 3/2/29 27.5 36.2 8.23 84 506 50 oc n 3/2/29 27.5 36.2 8.23 84 506 50 oc n 3/2/29 27.5 36.2 8.23 85 510 0 oc n 3/2/29 27.5 36.2 8.23 86 515 0 oc n 3/2/29 27.5 36.2 8.23 87 521 0 r n 3/2/29 27.5 36.2 8.22 88 5510 0 oc n 3/2/29 27.5 36.2 8.22 89 528 0 r n 3/2/29 27.5 36.2 8.22 80 516 0 oc n 3/2/29 27.5 36.2 8.22 81 540 0 r n 3/2/29 27.5 36.2 8.22 82 66 515 0 oc n 3/2/29 27.5 36.2 8.22 83 502 50 oc n 3/2/29 27.5 36.3 8.24 84 506 50 oc n 3/2/29 27.5 36.2 8.23 85 510 0 oc n 3/2/29 27.5 36.2 8.23 86 515 0 oc n 3/2/29 27.5 36.2 8.23 87 521 0 r n 3/2/29 27.5 36.2 8.23 89 528 0 r n 3/2/29 27.5 36.3 36.2 8.23 89 528 0 r n 3/2/29 27.8 36.2 8.23 89 528 0 r n 3/2/29 27.8 36.2 8.23 89 528 0 r n 3/2/29 28.5 36.3 36.2 8.29 91 540 0 oc n 3/2/29 28.5 36.0 8.39 92 549 100 r n 3/2/29 28.5 36.0 8.39 93 550 0 c n 3/2/29 28.5 36.0 8.39 93 550 0 c n 3/2/29 28.5 36.3 38.29 94 570 570 570 570 570 570 570 570 |         |        |     |              |   | 11/23/28 |       |      |      | 17                      |
| 47   |         |        |     |              |   | 11/23/28 |       |      |      | 20                      |
| 48   |         |        |     |              |   | 11/23/28 |       |      |      | 20                      |
| 61   |         |        |     |              |   | 11/25/28 |       | 36.4 | 8.24 | 16                      |
| 61 368 100 r p 12/28/28 10.8 34.0 8.03   74 456 0 r n 12/30/28 16.2 34.3 8.10   74 456 0 r n 2/12/29 24.2 35.6 8.17   78 475 0 oc n 2/20/29 24.6 36.0 8.17   78 477 100 oc n 2/20/29 24.6 36.0 8.17   78 478 0 oc p 2/20/29 24.6 36.0 8.17   79 482 50 r n 2/22/29 24.5 36.1 8.17   79 484 0 r p 2/22/29 25.2 36.0 8.17   80 486 0 oc n 2/24/29 25.2 36.0 8.17   80 486 0 oc n 2/24/29 26.0 35.9 8.20   80 487 50 r n 2/24/29 26.0 35.9 8.20   81 491 0 oc n 2/26/29 26.5 35.8 8.19   81 492 50 oc n 2/26/29 26.4 35.9 8.20   81 492 50 oc n 2/26/29 26.4 35.9 8.19   82 496 0 c n 2/28/29 27.2 36.3 8.21   82 497 50 oc n 2/28/29 27.2 36.3 8.21   83 501 0 c n 2/28/29 27.2 36.3 8.21   83 502 50 oc n 3/2/29 27.5 36.3 8.21   83 502 50 oc n 3/2/29 27.5 36.3 8.21   84 506 50 oc n 3/2/29 27.8 36.2 8.24   84 506 50 oc n 3/2/29 27.8 36.2 8.24   85 5511 50 r p 3/4/29 27.8 36.2 8.23   86 515 0 oc n 3/2/29 27.8 36.2 8.23   87 521 0 r p 3/4/29 27.8 36.2 8.23   88 526 0 r n 3/2/29 27.8 36.2 8.23   89 532 0 r n 3/2/29 27.8 36.2 8.22   89 532 0 r n 3/2/29 27.8 36.2 8.22   89 532 0 r n 3/2/29 27.8 36.2 8.22   80 516 0 oc n 3/2/29 27.8 36.2 8.22   80 515 0 oc n 3/2/29 27.8 36.2 8.22   81 551 0 oc n 3/2/29 27.8 36.2 8.22   82 89 532 0 r n 3/2/29 27.8 36.2 8.22   83 500 0 c n 3/2/29 27.8 36.2 8.22   84 506 516 0 oc n 3/2/29 27.8 36.2 8.22   85 511 50 r n 3/6/29 27.8 36.2 8.22   86 515 0 oc n 3/2/29 27.8 36.2 8.22   87 521 0 r n 3/21/29 28.5 35.8 8.23   89 532 0 r n 3/21/29 28.5 35.2 8.30   91 541 50 0 c n 3/21/29 28.5 35.2 8.30   92 545 0 r n 3/21/29 28.5 35.2 8.30   93 550 0 c n 3/21/29 28.5 35.3 8.29   93 550 0 c n 3/21/29 28.5 35.3 8.29   93 550 0 c n 3/21/29 28.5 35.3 8.29   93 550 0 c n 3/21/29 28.5 35.2 8.30   93 550 0 c n 3/21/29 28.5 35.2 8.30   93 550 0 c n 3/21/29 28.5 35.3 8.23   97 574 0 oc n 3/21/29 28.5 35.3 8.23   97 574 0 oc n 3/21/29 28.5 35.8 8.30   93 550 0 c n 3/21/29 28.5 35.8 8.30   93 550 0 c n 3/21/29 28.5 35.8 8.30   93 550 0 c n 3/21/29 28.5 34.7 8.30   94 3/21/29 28.5 34.7 8.26   95 574 0 oc n 3/21/29 28.5 34.7 8.26   96 568 0 r  |         | 364    |     |              | n | 12/28/28 | 14.0  | 34.0 | 8.05 | 60                      |
| 62 372 50  | 61      |        |     | С            | n |          | 10.8  | 34.0 | 8.03 | 80                      |
| 74   |         |        |     | r            | p |          | 10.8  |      |      | 80                      |
| 78   |         |        |     | r            | n |          |       |      |      | 28                      |
| 78   |         | 456    |     | $\mathbf{r}$ | n | 2/12/29  |       |      |      | 68                      |
| 78   | 78      | 475    |     |              |   | 2/20/29  |       |      |      | 32                      |
| 79   |         |        |     |              |   |          |       |      |      | 34                      |
| 79   |         |        |     |              |   |          |       |      |      | 32                      |
| 80   |         |        |     |              |   | 2/22/29  |       |      |      | 34                      |
| 80   |         |        |     |              |   | 2/22/29  |       |      |      | 34<br>36                |
| 80   |         |        |     |              |   | 2/24/29  | 26.0  |      |      | 29                      |
| 81   |         |        |     |              |   |          |       |      |      | 36                      |
| 81   |         |        |     |              |   | 2/24/25  |       |      |      | 38                      |
| 82   |         |        |     |              |   |          |       |      |      | 38                      |
| 82   |         |        |     |              |   | 2/28/29  |       |      |      | 34                      |
| 82   |         |        |     |              |   | 2/28/29  |       |      |      | 34                      |
| 83   |         |        |     |              |   |          |       |      |      | 34                      |
| 83   | 83      |        | 0   |              |   | 3/ 2/29  | 27.5  |      | 8.24 | 29                      |
| 84       506       50       oc       n       3/ 4/29       27.5       36.4       8.21         84       507       0       r       p       3/ 4/29       27.8       36.2       8.23         85       510       0       oc       n       3/ 6/29       27.9       36.2       8.22         85       511       50       r       n       3/ 6/29       27.9       36.2       8.22         85       512       0       r       p       3/ 6/29       27.9       36.2       8.22         86       515       0       oc       n       3/ 9/29       (28.3       36.2       8.29         86       516       0       oc       n       3/ 9/29       (28.3       36.2       8.29         87       521       0       r       n       3/ 21/29       28.5       35.9       8.23         88       526       0       r       n       3/ 23/29       28.4       35.6       8.25         89       532       0       r       n       3/ 23/29       28.4       35.6       8.25         91       541       50       r       n       3/ 27/29  | 83      | 502    | 50  | ос           | n | 3/ 2/29  |       |      |      | 25                      |
| 84       507       0       r       p       3/4/29       27.8       36.2       8.23         85       510       0       oc       n       3/6/29       27.9       36.2       8.22         85       511       50       r       n       3/6/29       27.8       36.2       8.22         85       512       0       r       p       3/6/29       27.9       36.2       8.22         86       515       0       oc       n       3/9/29       (28.3       36.2       8.29         86       516       0       oc       n       3/9/29       (28.3       36.2       8.29         87       521       0       r       n       3/21/29       28.3       36.1       8.28         88       526       0       r       n       3/21/29       28.4       35.6       8.25         89       532       0       r       n       3/23/29       (28.4       35.6       8.25         91       540       0       oc       n       3/27/29       28.7       35.1       8.30         91       541       50       r       n       3/22/29       2  |         |        |     | oc           | n |          |       |      | 8.23 | 24                      |
| 85         510         0         oc         n         3/6/29         27.9         36.2         8.22           85         511         50         r         n         3/6/29         27.9         36.2         8.22           85         512         0         r         p         3/6/29         27.9         36.2         8.22           86         515         0         oc         n         3/8/29         (28.3         36.2         8.29           86         516         0         oc         n         3/9/29         (28.3         36.2         8.29           87         521         0         r         n         3/21/29         28.5         35.9         8.23           88         526         0         r         n         3/23/29         28.4         35.6         8.25           89         532         0         r         n         3/27/29         28.7         35.1         8.30           91         541         50         r         n         3/27/29         28.5         35.2         8.30           92         545         0         r         n         3/29/29         28.5         35.3   |         |        |     |              | n |          |       |      |      | 24                      |
| 85         511         50         r         n         3/6/29         27.8         36.2         8.22           85         512         0         r         p         3/6/29         27.9         36.2         8.22           86         515         0         oc         n         3/8/29         (28.3         36.2         8.29           86         516         0         oc         n         3/9/29         (28.3         36.2         8.29           87         521         0         r         n         3/1/29         27.8         36.1         8.28           88         526         0         r         n         3/21/29         28.5         35.9         8.23           89         532         0         r         n         3/23/29         28.4         35.6         8.25           91         540         0         oc         n         3/27/29         28.7         35.1         8.30           91         541         50         r         n         3/29/29         28.5         35.3         8.29           92         545         0         r         n         3/29/29         28.5         35.3   |         |        |     |              |   | 3/ 4/29  |       |      |      | 24                      |
| 85         512         0         r         p         3/6/29         27.9         36.2         8.22           86         515         0         oc         n         3/8/29         (28.3         36.2         8.29           86         516         0         oc         n         3/9/29         (28.3         36.2         8.29           87         521         0         r         n         3/11/29         27.8         36.1         8.28           88         526         0         r         n         3/21/29         28.5         35.9         8.23           89         528         0         r         n         3/23/29         28.4         35.6         8.25           89         532         0         r         n         3/23/29         28.4         35.6         8.25           91         540         0         oc         n         3/27/29         28.7         35.1         8.30           91         541         50         r         n         3/29/29         28.5         35.3         8.29           92         545         0         r         n         3/29/29         28.5         35.   |         |        |     |              |   |          |       | 000  | 0.00 | 40                      |
| 86       515       0       oc       n       3/8/29       (28.3)       36.2       8.29         86       516       0       oc       n       3/9/29       (28.3)       36.2       8.29         87       521       0       r       n       3/11/29       27.8       36.1       8.28         88       526       0       r       n       3/21/29       28.5       35.9       8.23         89       528       0       r       n       3/23/29       (28.4       35.6       8.25         89       532       0       r       n       3/23/29       (28.4       35.6       8.25         91       540       0       oc       n       3/27/29       28.7       35.1       8.30         91       541       50       r       n       3/27/29       28.5       35.2       8.30         92       545       0       r       n       3/29/29       28.5       35.2       8.30         92       549       100       r       p       3/29/29       26.2       36.0       8.28         93       550       0       c       n       3/31/29   |         |        |     |              |   | 3/ 6/29  | 27.8  | 30.2 | 8 22 | 40                      |
| 86       516       0       oc       n       3/ 9/29       (28.3)       36.2       8.29         87       521       0       r       n       3/11/29       27.8       36.1       8.28         88       526       0       r       n       3/21/29       28.5       35.9       8.23         89       528       0       r       n       3/23/29       28.4       35.6       8.25         89       532       0       r       n       3/23/29       (28.4       35.6       8.25         91       540       0       oc       n       3/27/29       28.7       35.1       8.30         91       541       50       r       n       3/29/29       28.5       35.2       8.30         92       545       0       r       n       3/29/29       28.5       35.3       8.29         92       549       100       r       p       3/29/29       28.5       35.3       8.29         93       550       0       c       n       3/31/29       28.7       34.7       8.30         93       551       50       oc       p       3/31/29   |         |        | 0   |              |   | 3/ 8/20  | (28.3 |      | 8 20 | 20)                     |
| 87 521 0 r n 3/11/29 27.8 36.1 8.28 88 526 0 r n 3/21/29 28.5 35.9 8.23 89 528 0 r n 3/23/29 28.4 35.6 8.25 89 532 0 r n 3/23/29 (28.4 35.6 8.25 91 540 0 oc n 3/27/29 28.7 35.1 8.30 91 541 50 r n 3/27/29 28.5 35.2 8.30 92 545 0 r n 3/29/29 28.5 35.3 8.29 92 549 100 r p 3/29/29 28.5 35.3 8.29 92 549 100 r p 3/29/29 28.5 35.3 8.29 93 550 0 c n 3/31/29 28.7 34.7 8.30 93 551 50 oc n 3/31/29 28.7 34.7 8.30 93 552 0 oc p 3/31/29 28.5 34.8 8.30 93 552 0 oc p 3/31/29 28.5 34.8 8.30 93 552 0 oc n 3/31/29 28.5 34.8 8.30 93 557 0 oc n 3/29/29 28.5 35.3 8.28 97 574 0 oc n 4/26/29 29.3 35.3 8.23 97 574 0 oc n 4/26/29 29.3 35.3 8.23 97 576 100 r n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   | 3/ 9/29  |       |      |      | 20)                     |
| 88     526     0     r     n     3/21/29     28.5     35.9     8.23       89     528     0     r     n     3/23/29     28.4     35.6     8.25       89     532     0     r     n     3/23/29     (28.4     35.6     8.25       91     540     0     oc     n     3/27/29     28.7     35.1     8.30       91     541     50     r     n     3/27/29     28.5     35.2     8.30       92     545     0     r     n     3/29/29     28.5     35.3     8.29       92     549     100     r     p     3/29/29     26.2     36.0     8.28       93     550     0     c     n     3/31/29     28.7     34.7     8.30       93     551     50     oc     n     3/31/29     28.5     34.8     8.30       93     552     0     oc     p     3/31/29     28.7     34.7     8.26       96     568     0     r     n     4/26/29     29.3     35.3     8.23       97     576     100     r     n     4/28/29     27.6     35.6     8.15       101  |         |        |     |              |   | 3/11/29  |       |      |      | 17                      |
| 89       528       0       r       n       3/23/29       28.4       35.6       8.25         89       532       0       r       n       3/23/29       (28.4       35.6       8.25         91       540       0       oc       n       3/27/29       28.7       35.1       8.30         91       541       50       r       n       3/27/29       28.5       35.2       8.30         92       545       0       r       n       3/29/29       28.5       35.3       8.29         92       549       100       r       p       3/29/29       26.2       36.0       8.28         93       550       0       c       n       3/31/29       28.7       34.7       8.30         93       551       50       oc       n       3/31/29       28.5       34.8       8.30         93       552       0       oc       p       3/31/29       28.7       34.7       8.26         96       568       0       r       n       4/28/29       29.3       35.3       8.23         97       576       100       r       n       4/28/29   |         |        |     |              |   | 3/21/29  |       |      |      | 16                      |
| 89     532     0     r     n     3/23/29     (28.4     35.6     8.25       91     540     0     oc     n     3/27/29     28.7     35.1     8.30       91     541     50     r     n     3/27/29     28.5     35.2     8.30       92     545     0     r     n     3/29/29     28.5     35.3     8.29       92     549     100     r     p     3/29/29     26.2     36.0     8.28       93     550     0     c     n     3/31/29     28.7     34.7     8.30       93     551     50     oc     n     3/31/29     28.5     34.8     8.30       93     552     0     oc     p     3/31/29     28.7     34.7     8.26       96     568     0     r     n     4/26/29     29.3     35.3     8.23       97     574     0     oc     n     4/28/29     28.3     35.2     8.16       97     576     100     r     n     4/28/29     27.6     35.6     8.15       101     604     50     r     n     5/15/29     26.8     34.9     8.23   |         |        |     |              |   | 3/23/29  |       |      |      | 21                      |
| 91 540 0 oc n 3/27/29 28.7 35.1 8.30 91 541 50 r n 3/27/29 28.5 35.2 8.30 92 545 0 r n 3/29/29 28.5 35.3 8.29 92 549 100 r p 3/29/29 26.2 36.0 8.28 93 550 0 c n 3/31/29 28.7 34.7 8.30 93 551 50 oc n 3/31/29 28.5 34.8 8.30 93 552 0 oc p 3/31/29 28.5 34.8 8.30 93 552 0 oc p 3/31/29 28.7 34.7 8.26 96 568 0 r n 4/26/29 29.3 35.3 8.23 97 574 0 oc n 4/26/29 29.3 35.3 8.23 97 574 0 or n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   | 3/23/29  | (28.4 |      | 8.25 | 21)                     |
| 91 541 50 r n 3/27/29 28.5 35.2 8.30 92 545 0 r n 3/29/29 28.5 35.3 8.29 92 549 100 r p 3/29/29 26.2 36.0 8.28 93 550 0 c n 3/31/29 28.7 34.7 8.30 93 551 50 oc n 3/31/29 28.5 34.8 8.30 93 552 0 oc p 3/31/29 28.7 34.7 8.26 96 568 0 r n 4/26/29 29.3 35.3 8.23 97 574 0 oc n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   | 3/27/29  | 28.7  | 35.1 | 8.30 | 21                      |
| 92     545     0     r     n     3/29/29     28.5     35.3     8.29       92     549     100     r     p     3/29/29     26.2     36.0     8.28       93     550     0     c     n     3/31/29     28.7     34.7     8.30       93     551     50     oc     n     3/31/29     28.5     34.8     8.30       93     552     0     oc     p     3/31/29     28.7     34.7     8.26       96     568     0     r     n     4/26/29     29.3     35.3     8.23       97     574     0     oc     n     4/28/29     28.3     35.2     8.16       97     576     100     r     n     4/28/29     27.6     35.6     8.15       101     604     50     r     n     5/15/29     26.2     34.7     8.24       105     627     50     c     n     5/15/29     26.8     34.9     8.23       105     628     50     r     n     5/15/29     26.8     34.9     8.23  |         |        |     |              |   | 3/27/29  | 28.5  | 35.2 | 8.30 | 24                      |
| 93 550 0 c n 3/31/29 28.7 34.7 8.30 93 551 50 oc n 3/31/29 28.5 34.8 8.30 93 552 0 oc p 3/31/29 28.7 34.7 8.26 96 568 0 r n 4/26/29 29.3 35.3 8.23 97 574 0 oc n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   | 92      | 545    | 0   |              |   | 3/29/29  | 28.5  |      |      | 28                      |
| 93 550 0 c n 3/31/29 28.7 34.7 8.30 93 551 50 oc n 3/31/29 28.5 34.8 8.30 93 552 0 oc p 3/31/29 28.7 34.7 8.26 96 568 0 r n 4/26/29 29.3 35.3 8.23 97 574 0 oc n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   |          |       |      |      | 28                      |
| 93 552 0 oc p 3/31/29 28.7 34.7 8.26 96 568 0 r n 4/26/29 29.3 35.3 8.23 97 574 0 oc n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              | n |          |       |      |      | 28                      |
| 96 568 0 r n 4/26/29 29.3 35.3 8.23 1 97 574 0 oc n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23  |         |        |     |              |   | 3/31/29  |       |      |      | 28                      |
| 97 574 0 oc n 4/28/29 28.3 35.2 8.16 97 576 100 r n 4/28/29 27.6 35.6 8.15 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23  |         |        |     |              |   |          | 28.7  |      |      | 14                      |
| 97 576 100 r n 4/28/29 27.6 35.6 8.15 3 101 604 50 r n 5/7/29 26.2 34.7 8.24 105 627 50 c n 5/15/29 26.8 34.9 8.23 105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   |          | 29.3  | 35.3 |      | 12                      |
| 101 604 50 r n 5/7/29 26.2 34.7 8.24<br>105 627 50 c n 5/15/29 26.8 34.9 8.23<br>105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   |          |       |      |      | 24                      |
| 105 627 50 c n 5/15/29 26.8 34.9 8.23<br>105 628 50 r n 5/15/29 26.8 34.9 8.23   |         |        |     |              |   | 4/28/29  |       |      |      | 25                      |
| 105 628 50 r n 5/15/29 26.8 34.9 8.23  |         |        |     |              |   |          |       |      |      | 8<br>5<br>5<br>5        |
| 1UD 028 DU F II 3/13/28 20.0 34.8 8.23   |         |        |     |              |   |          |       |      |      | 5                       |
|  |         |        |     |              |   |          |       |      |      | 5                       |
|  |         |        |     |              |   |          |       |      |      | 4                       |
| 107 640 50 r n 5/19/29 27.9 34.4 8.23<br>113 680 0 oc n 6/25/29 24.2 34.5 8.25   |         |        |     |              |   |          |       |      |      | 5                       |

Table 44. Distributional and environmental records for Ceratium deflexum--Concluded

| Station     | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO <sub>4</sub> mg/m <sup>3</sup> |
|-------------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|-----------------------------------|
| 113         | 682    | 100       | r                  | n              | 6/25/29  | 21.5                | 34.7               | 8.23 | 0                                 |
| 150         | 929    | 0         | c                  | n              | 10/23/29 | 25.6                | 34.7               | 8.39 | 8 7                               |
| 150         | 930    | 50        | oc                 | n              | 10/23/29 | 22.8                | 34.8               | 8.35 | 10                                |
| 150         | 933    | 0         | oc                 | p              | 10/23/29 | 25.6                | 34.7               | 8.39 | 7                                 |
| 150         | 934    | 50        | r                  | p              | 10/23/29 | 22.8                | 34.8               | 8.35 | 10                                |
| 150         | 935    | 100       | r                  | p              | 10/23/29 | 19.6                | 34.6               | 8.32 | 11                                |
| 150         | 931    | 100       | ос                 | n              | 10/23/29 | 19.6                | 34.6               | 8.32 | 11                                |
| 151         | 937    | 0         | c                  | n              | 10/26/29 | 26.0                | 34.0               |      |                                   |
| 151         | 941    | 0         | r                  | p              | 10/26/29 | 26.0                | 34.0               |      |                                   |
| 152         | 944    | 00        | oc                 | n              | 10/27/29 | 27.4                | 33.7               | 8.35 | 20                                |
| 152         | 948    | 0         | r                  | p              | 10/27/29 | 27.4                | 33.7               | 8.35 | 20                                |
| 153         | 951    | 0         | r                  | 'n             | 10/29/29 | 28.1                | 34.2               | 8.47 | 7                                 |
| 153         | 953    | 100       | r                  | n              | 10/29/29 | 20.5                | 34.7               | 8.28 | 31                                |
| 153         | 955    | 0         | r                  | p              | 10/29/29 | 28.1                | 34.2               | 8.47 | 7                                 |
| 155         | 965    | 0         | r                  | n              | 11/ 2/29 | 27.8                | 34.9               | 8.29 | 29                                |
| 156         | 972    | 0         | r                  | n              | 11/ 4/29 | 27.6                | 35.0               | 8.34 | 28                                |
| 156         | 974    | 100       | r                  | n              | 11/ 4/29 | 26.4                | 35.1               | 8.30 | 48                                |
| 157         | 978    | 0         | r                  | n              | 11/ 6/29 | 27.1                | 35.3               | 8.27 | 47                                |
| <b>15</b> 8 | 983    | 0         | oc                 | n              | 11/ 8/29 | 28.2                | 35.6               | 8.34 | 36                                |
| 158         | 984    | 50        | oc                 | n              | 11/ 8/29 | 28.2                | 35.6               | 8.39 | 50                                |
| <b>15</b> 8 | 985    | 100       | oc                 | n              | 11/ 8/29 | 27.6                | 35.9               | 8.39 | 48                                |
| 159         | 991    | 50        | r                  | n              | 11/11/29 | 28.5                | 35.7               | 8.39 | 15                                |
| 160         | 1000   | 0         | r                  | n              | 11/13/29 | 28.6                | 35.6               | 8.37 | 12                                |

Table 45. Distributional and environmental records for Ceratium carriense

| Station  | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m <sup>3</sup>   |
|----------|------------|-----------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|----------------------------|
| 1        | 1          | 0         |                    |                | E /10 /00          | 04.0                | 00.0               | 0.10         | 0.4                        |
| 1        | 1          | 0         | r                  | n              | 5/12/28            | 24.0                | 36.2               | 8.16         | 34                         |
| 1        | 2<br>6     | 70        | r                  | n              | 5/12/28            | (22.4               | 36.4               | 8.17         | 35)                        |
| 1b       |            | 0         | С                  | n              | 5/16/28            | (22.3               | 36.3               | 8.20         | 46)                        |
| 13a      | 89         | 0         | r                  | n              | 8/ 8/28            | (21.2               | 35.2               | 8.18         | 11)                        |
| 16       | 103        | 0         | $\mathbf{r}$       | p              | 8/13/28            | 25.9                | 36.2               | 8.24         | 8                          |
| 16       | 104        | 50        | г                  | p              | 8/13/28            | 24.4                | 36.4               | 8.23         | 8                          |
| 16       | 106        | 0         | r                  | n              | 8/13/28            | 25.9                | 36.2               | 8.24         | 8                          |
| 16       | 107        | 50        | r                  | n              | 8/13/28            | 24.4                | 36.4               | 8.23         | 8                          |
| 17       | 112        | 50        | r                  | n              | 8/15/28            | 21.9                | 36.6               | 8.28         | 12                         |
| 19       | 121<br>122 | 50        | r                  | p              | 8/20/28            | 25.2                | 37.1               | 8.27         | 5                          |
| 19       |            | 0         | С                  | n              | 8/20/28            | 26.6                | 37.0               | 8.34         | 5<br>5<br>5                |
| 19       | 123        | 50        | oc                 | n              | 8/20/28            | 25.2                | 37.1               | 8.27         | 5                          |
| 19       | 124<br>145 | 100       | ос                 | n              | 8/20/28            | 22.4                | 37.0               | 8.25         | 5                          |
| 23<br>23 | 145        | 0<br>50   | r                  | p              | 8/29/28            | 27.2                | 35.9               | 8.25         | 4                          |
| 23       | 149        | 50<br>50  | r                  | p              | 8/29/28            | 20.9                | 36.0               | 8.14         | 13                         |
| 23       | 149        | 100       | oc                 | n              | 8/29/28            | 20.9                | 36.0<br>36.0       | 8.14         | 13<br>75                   |
| 25       | 160        | 0         | r                  | n              | 8/29/28<br>9/ 3/28 | 16.6<br>27.5        | 35.6               | 8.18<br>8.31 | 5                          |
| 25       | 161        | 50        | r                  | n              | 9/ 3/28            | 21.5                | 36.0               | 8.22         | 12                         |
| 28       | 174        | 50        | r                  | n              | 9/11/28            | 26.7                | 36.3               | 8.26         | 4                          |
| 28       | 176        | 0         | r                  | p              | 9/11/28            | 27.6                | 36.3               | 8.29         | 4                          |
| 28       | 178        | 100       | r                  | n<br>n         | 9/11/28            | 22.8                | 36.6               | 8.22         |                            |
| 31       | 191        | 0         | r                  | n              | 10/ 3/28           | 28.5                | 34.4               | 8.27         | 7<br>2<br>2<br>2<br>2<br>3 |
| 31       | 192        | 50        | r                  | n              | 10/ 3/28           | 28.2                | 35.4               | 8.23         | 2                          |
| 32       | 194        | ő         | r                  | n              | 10/ 5/28           | 28.0                | 36.0               | 8.23         | 2                          |
| 34       | 202        | 50        | oc                 | n              | 10/ 9/28           | 25.0                | 36.5               | 8.21         | 3                          |
| 35       | 203        | 0         | r                  | n              | 10/26/28           | 27.4                | 29.7               | 8.31         | 15                         |
| 35       | 204        | 50        | r                  | n              | 10/26/28           | 16.8                | 34.7               | 7.92         | 138                        |
| 37       | 217        | 0         | r                  | n              | 11/ 1/28           | 27.1                | 31.7               | 8.28         | 15                         |
| 37       | 219        | 100       | r                  | n              | 11/ 1/28           | 15.1                | 34.9               | 7.82         | 153                        |
| 37       | 220        | 0         | ос                 | p              | 11/ 1/28           | 27.1                | 31.7               | 8.28         | 15                         |
| 40       | 232        | 0         | r                  | p              | 11/ 8/28           | 22.2                | 33.7               | 8.21         | 24                         |
| 41       | 235        | 0         | Г                  | n              | 11/10/28           | 20.4                | 34.2               | 8.11         | 32                         |
| 41       | 238        | 0         | r                  | p              | 11/10/28           | 20.4                | 34.2               | 8.11         | 32                         |
| 44       | 255        | 100       | r                  | p              | 11/17/28           | 13.8                | 35.0               | 7.85         | 70                         |
| 45       | 256        | 0         | r                  | n              | 11/19/28           | 22.4                | 35.3               | 8.12         | 38                         |
| 46       | 261        | 0         | oc                 | n              | 11/21/28           | 23.3                | 35.3               | 8.16         | 36                         |
| 46       | 262        | 50        | oc                 | n              | 11/21/28           | 23.2                | 35.3               | 8.16         | 40                         |
| 46       | 263        | 100       | r                  | n              | 11/21/28           | 22.5                | 35.4               | 8.17         | 40                         |
| 46       | 264        | 0         | r                  | p              | 11/21/28           | 23.3                | 35.3               | 8.16         | 36                         |
| 47       | 266        | 0         | r                  | n              | 11/23/28           | 23.9                | 36.0               | 8.23         | 17                         |
| 47       | 267        | 50        | oc                 | n              | 11/23/28           | 23.8                | 36.0               | 8.23         | 20                         |
| 47       | 268        | 100       | oc                 | n              | 11/23/28           | 22.7                | 36.2               | 8.23         | 20                         |
| 47       | 269        | 0         | r                  | p              | 11/23/28           | 23.9                | 36.0               | 8.23         | 27                         |
|          |            |           |                    |                |                    |                     |                    |              |                            |

Table 45. Distributional and environmental records for Ceratium carriense--Continued

| Station        | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature (°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m <sup>3</sup> |
|----------------|------------|-----------|--------------------|----------------|----------------------|------------------|--------------------|--------------|--------------------------|
| 48             | 271        | 0         | oc                 | n              | 11/25/28             | 23.6             | 36.4               | 8.23         | 13                       |
| 48             | 272        | 50        | oc                 | n              | 11/25/28             | 23.6             | 36.4               | 8.24         | 16                       |
| 48<br>48       | 273<br>274 | 100       | oc                 | n              | 11/25/28             | 22.7             | 36.3               | 8.26         | 16                       |
| 48             | 276        | 100       | r                  | p<br>p         | 11/25/28<br>11/25/28 | 23.6<br>22.7     | 36.4<br>36.3       | 8.23<br>8.26 | 13<br>16                 |
| 49             | 277        | 0         | oc                 | n              | 11/27/28             | 23.4             | 36.2               | 8.27         | 13                       |
| 49             | 278        | 50        | oc                 | . n            | 11/27/29             | 22.6             | 36.1               | 8.26         | 13                       |
| 49             | 279        | 100       | oc                 | n              | 11/27/28             | 21.6             | 35.9               | 8.26         | 13                       |
| 49a<br>50      | 283<br>284 | 0         | oc<br>oc           | n<br>n         | 11/28/28<br>11/29/28 | (23.2<br>23.2    | 36.0<br>36.0       | 8.23<br>8.23 | 13)<br>13                |
| 50             | 285        | 50        | oc                 | n              | 11/29/28             | 22.0             | 35.9               | 8.23         | 13                       |
| 50             | 286        | 100       | oc                 | n              | 11/29/28             | 20.5             | 35.7               | 8.22         | 13                       |
| 50<br>50       | 288<br>289 | 50<br>100 | oc                 | p              | 11/29/28<br>11/29/28 | 22.0             | 35.9               | 8.23         | 13                       |
| 50-51          | 291        | 0         | r<br>oc            | p<br>n         | 11/29/28             | 20.5<br>(22.8    | 35.7<br>35.6       | 8.22<br>8.22 | 13<br>16)                |
| 50-51          | 292        | Ō         | oc                 | , n            | 11/30/28             | (22.8            | 35.6               | 8.22         | 16)                      |
| 51             | 293        | 0         | oc                 | n              | 12/ 1/28             | 22.8             | 35.6               | 8.22         | 16                       |
| 51<br>51       | 294<br>295 | 50<br>100 | oc<br>oc           | n<br>n         | 12/ 1/28<br>12/ 1/28 | 20.5<br>20.0     | 35.6<br>35.6       | 8.22<br>8.22 | 17<br>17                 |
| 51             | 296        | 0         | r                  | p              | 12/ 1/28             | 22.8             | 35.6               | 8.22         | 16                       |
| 52             | 299        | Ó         | r                  | n              | 12/ 3/28             | 22.5             | 35.4               | 8.21         | 8                        |
| 52             | 300        | 50 🐇      | ос                 |                | 12/ 3/28             | 20.2             | 35.6               | 8.20         | 8                        |
| 52<br>53       | 302<br>304 | 0<br>50   | r<br>oc            | p<br>n         | 12/ 3/28<br>12/ 5/28 | 22.5<br>21.2     | 35.4<br>35.8       | 8.21<br>8.20 | 8<br>13                  |
| 53             | 305        | 100       | oc                 | n              | 12/ 5/28             | 19.9             | 35.6               | 8.19         | 13                       |
| 53-54          | 308        | 0         | oc                 |                | 12/ 6/28             | (23.0            | 35.6               | 8.22         | 11)                      |
| 53-54<br>54    | 310<br>320 | 0<br>50   | oc                 | n              | 12/10/28             | (23.0<br>19.8    | 35.6               | 8.22         | 11)                      |
| 54             | 321        | 100       | oc<br>oc           | n<br>n         | 12/14/28<br>12/14/28 | 18.7             | 35.4<br>35.4       | 8.18<br>8.16 | 17<br>20                 |
| 55             | 323        | 0         | r                  | n              | 12/16/28             | 20.4             | 34.9               | 8.19         | 12                       |
| 55             | 324        | 50        | oc                 | n              | 12/16/28             | 18.7             | 35.0               | 8.18         | 12                       |
| 55<br>56       | 327<br>328 | 50<br>0   | r<br>c             | p<br>n         | 12/16/28<br>12/18/28 | 18.7<br>20.8     | 35.0<br>34.9       | 8.18<br>8.13 | 12<br>9                  |
| 56             | 330        | 100       | oc                 | n              | 12/18/28             | 16.6             | 34.8               | 8.11         | 12                       |
| 56             | 332        | 50        | r                  | р              | 12/18/28             | 18.5             | 35.1               | 8.14         | 9                        |
| 56-57<br>57    | 334<br>335 | 0         | oc                 | n              | 12/19/28             | (19.0            | 34.5               | 8.14         | 20)                      |
| 57             | 338        | ő         | oc<br>oc           |                | 12/20/28<br>12/20/28 | 19.0<br>19.0     | 34.5<br>34.5       | 8.14<br>8.14 | 20<br>20                 |
| 59             | 352        | 50        | r                  |                | 12/24/28             | 14.0             | 34.0               | 8.08         | - 38                     |
| 67             | 416        | 0         | r                  | n              | 1/8/29               | 19.3             | 34.9               | 8.11         | 21                       |
| 69<br>69       | 424<br>425 | 0<br>50   | oc<br>r            | n<br>n         | 1/12/29<br>1/12/29   | 21.1<br>17.4     | 35.2<br>35.1       | 8.12<br>7.99 | 62<br>151                |
| 69             | 427        | 0         | r                  | p              | 1/12/29              | 21.1             | 35.2               | 8.12         | 62                       |
| 71             | 438        | 0         | r                  | n              | 2/ 6/29              | 23.5             | 35.2               | 8.13         | 58                       |
| 75<br>75       | 462<br>463 | 0<br>50   | oc                 | n              | 2/14/29              | 22.8             | 35.8               | 8.18         | 44                       |
| 75             | 464        | 100       | r                  | n<br>n         | 2/14/29<br>2/14/29   | 20.0<br>17.8     | 35.5<br>35.4       | 8.14<br>8.00 | 46<br>75                 |
| 75             | 466        | 50        | r                  | p              | 2/14/29              | 20.0             | 35.5               | 8.14         | 46                       |
| 76             | 467        | 0         | oc                 | n              | 2/16/29              | 23.4             | 35.9               | 8.15         | 50                       |
| 76<br>77       | 471<br>472 | 50<br>0   | oc oc              | p<br>n         | 2/16/29<br>2/18/29   | 22.1<br>23.7     | 35.9<br>36.0       | 8.14<br>8.19 | 42<br>16                 |
| 77             | 473        | ő         | r                  | p              | 2/18/29              | 23.7             | 36.0               | 8.19         | 16                       |
| 78             | 475        | 0         | r                  | n              | 2/20/29              | 24.6             | 36.0               | 8.17         | 32                       |
| 78<br>78       | 478        | 100<br>0  | oc                 | n              | 2/20/29<br>2/20/29   | 21.9<br>24.6     | 36.2<br>36.0       | 8.14<br>8.17 | 34<br>32                 |
| 79             | 482        | 50        | r                  | p<br>n         | 2/22/29              | 24.5             | 36.1               | 8.17         | 34                       |
| 79             | 483        | 100       | oc                 | n              | 2/22/29              | 21.8             | 36.2               | 8.13         | 45                       |
| 80             | 486        | 0         | oc                 | n              | 2/24/29              | 26.0             | 35.9               | 8.20         | 36                       |
| 80<br>80       | 487<br>488 | 50<br>0   | r<br>.oc           | n<br>p         | 2/24/29<br>2/24/29   | 25.9<br>26.0     | 36.0<br>35.9       | 8.19<br>8.20 | 29<br>36                 |
| 80             | 489        | 50        | r                  | p              | 2/24/29              | 25.9             | 36.0               | 8.19         | 29                       |
| 81             | 491        | 0         | oc                 | n              | 2/26/29              | 26.5             | 35.8               | 8.19         | 38                       |
| 81<br>81       | 492<br>493 | 50<br>0   | oc                 | n              | 2/26/29              | 26.4<br>26.5     | 35.9<br>35.8       | 8.19<br>8.19 | 38<br>38                 |
| 81             | 494        | 50        | r                  | p<br>p         | 2/26/29<br>2/26/29   | 26.4             | 35.9               | 8.19         | 38                       |
| 81             | 495        | 100       | r                  | p              | 2/26/29              | 23.6             | 36.2               | 8.18         | 36                       |
| 82             | 496        | 0         | oc                 | n              | 2/28/29              | 27.2             | 36.3               | 8.21         | 34                       |
| 82<br>82       | 497<br>498 | 50<br>0   | oc<br>r            | n              | 2/28/29<br>2/28/29   | 27.2<br>27.2     | 36.3<br>36.3       | 8.21<br>8.21 | 34<br>34                 |
| 83             | 501        | Ö         | c                  | p<br>n         | 3/ 2/29              | 27.5             | 36.3               | 8.24         | 29                       |
| 83             | 502        | 50        | oc                 | n              | 3/ 2/29              | 27.4             | 36.5               | 8.24         | 25                       |
| 83<br>84       | 503        | 0         | r                  | p              | 3/ 2/29              | 27.5             | 36.3               | 8.24<br>8.23 | 29                       |
| 0.44           | 505        | 0<br>50   | oc<br>oc           | n<br>n         | 3/ 4/29<br>3/ 4/29   | 27.8<br>27.5     | 36.2<br>36.4       | 8.23         | 24<br>24                 |
|                | 506        |           |                    |                |                      |                  |                    |              |                          |
| 84<br>85<br>85 | 506<br>510 | 0<br>50   | oc                 | n              | 3/ 6/29<br>3/ 6/29   | 27.9<br>27.8     | 36.2<br>36.2       | 8.22<br>8.22 | 40<br>40                 |

Table 45. Distributional and environmental records for Ceratium carriense--Continued

| Station    | Sample      | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m |
|------------|-------------|--------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|-------------------------|
| 0.0        | E15         |              |                    |                | 2 ( 0 (00          |                     |                    | 0.00         |                         |
| 86<br>86   | 515<br>516  | 0            | r                  | n              | 3/ 8/29<br>3/ 9/29 | (28.3<br>28.3       | 36.2<br>36.2       | 8.29<br>8.29 | 20)<br>20               |
| 86         | 519         | 50           | oc<br>r            | n<br>p         | 3/ 9/29            | 27.4                | 36.2               | 8.29         | 17                      |
| 87         | 522         | 50           | oc                 | n              | 3/11/29            | 26.5                | 36.1               | 8.26         | 20                      |
| 88         | 526         | 0            | ос                 | n              | 3/21/29            | 28.5                | 35.9               | 8.23         | 16                      |
| 88         | 527         | 50           | r                  | n              | 3/21/29            | 28.4                | 35.9               | 8.25         | 13                      |
| 89         | <b>52</b> 9 | 50           | oc                 | n              | 3/23/29            | 28.6                | 35.8               | 8.27         | 12                      |
| 90<br>90   | 533<br>534  | 0<br>50      | r                  | n              | 3/25/29            | 28.5                | 35.5               | 8.27<br>8.26 | 21<br>21                |
| 90         | 535         | 0            | r                  | n<br>p         | 3/25/29<br>3/25/29 | 28.6<br>28.5        | 35.6<br>35.5       | 8.27         | 21                      |
| 91         | 540         | ŏ            | oc                 | n              | 3/27/29            | 28.7                | 35.1               | 8.30         | 21                      |
| 91         | 541         | 50           | ос                 | n              | 3/27/29            | 28.5                | 35.2               | 8.30         | 24                      |
| 91         | 544         | 100          | r                  | p              | 3/27/29            | <b>25</b> .8        | 36.0               | 8.25         | 30                      |
| 92         | 546         | 50           | r                  | n              | 3/29/29            | 28.4                | 35.4               | 8.29         | 28                      |
| 93<br>93   | 550         | 0<br>50      | c                  | n              | 3/31/29<br>3/31/29 | 28.7                | 34.7<br>34.8       | 8.30<br>8.30 | 28<br>28                |
| 93         | 551<br>553  | 100          | c<br>r             | n<br>p         | 3/31/29            | 28.5<br>27.6        | 35.8               | 8.27         | 29                      |
| Samoa      | 555         | 0            | r                  | n              | 4/ 2/29            | 21.0                |                    | 0.27         |                         |
| 94         | 558         | 50           | r                  | n              | 4/22/29            | 29.3                | 34.7               | 8.25         | 14                      |
| 95         | 563         | 50           | c                  | n              | 4/24/29            | 29.3                | 34.9               | 8.24         | 16                      |
| 95         | 564         | 100          | ос                 | n              | 4/24/29            | 28.5                | 35.4               | 8.22         | 21                      |
| 95         | 566         | 50           | r                  | p              | 4/24/29            | 29.3                | 34.9               | 8.24         | 16                      |
| 96<br>96   | 568A        | 0            | oc                 | n              | 4/25/29            | (29.4<br>29.3       | 34.7<br>35.3       | 8.26<br>8.23 | 14)<br>12               |
| 96         | 568<br>569  | 50           | oc<br>oc           | n<br>n         | 4/26/29<br>4/26/29 | 29.3                | 35.3               | 8.23         | 12                      |
| 96         | 570         | 100          | r                  | n              | 4/26/29            | 28.2                | 35.7               | 8.19         | 25                      |
| 96         | 571         | 0            | r                  | p              | 4/26/29            | 29.3                | 35.3               | 8.23         | 12                      |
| 96         | 572         | 50           | r                  | p              | 4/26/29            | 29.2                | 35.3               | 8.23         | 12                      |
| 97         | 574         | 0            | oc                 | n              | 4/28/29            | 28.3                | 35.2               | 8.16         | 24                      |
| 97<br>97   | 575         | 50           | C                  | n              | 4/28/29            | 28.0<br>27.6        | 35.4<br>35.6       | 8.16<br>8.15 | 21<br>25                |
| 98         | 576<br>581  | 100          | oc<br>oc           | n<br>n         | 4/28/29<br>4/30/29 | 27.0                | 35.3               | 8.16         | 24                      |
| 98         | 582         | 50           | r                  | n              | 4/30/29            | 26.9                | 35.3               | 8.16         | 28                      |
| 98         | 583         | 100          | oc                 | n              | 4/30/29            | 26.7                | 35.4               | 8.14         | 32                      |
| 99         | 589         | 0            | oc                 | n              | 5/ 2/29            | 27.9                | 34.9               | 8.21         | 12                      |
| 99         | 590         | 50           | c                  | n              | 5/ 2/29            | 27.8                | 34.9               | 8.22         | 12                      |
| 99         | 591         | 100          | r                  | n              | 5/ 2/29            | 27.8                | 35.0               | 8.22<br>8.21 | 17<br>12                |
| 99         | 592<br>595  | 0            | r<br>oc            | p<br>n         | 5/ 2/29<br>5/ 2/29 | 27.9<br>27.9        | 34.9<br>34.9       | 8.21         | 12                      |
| 100        | 596         | 50           | oc                 | n              | 5/ 4/29            | 27.6                | 34.7               | 8.21         | 10                      |
| 100        | 597         | 100          | oc                 | n              | 5/ 4/29            | 27.6                | 34.7               | 8.22         | 12                      |
| 101        | 603         | 0            | oc                 | n              | 5/ 7/29            | 26.3                | 34.7               | 8.24         | 8                       |
| 101        | 604         | 50           | oc                 | n              | 5/ 7/29            | 26.2                | 34.7               | 8.24         | 8                       |
| 101        | 605         | 100          | r                  | n              | 5/ 7/29<br>5/ 7/29 | 25.2<br>25.2        | 35.1<br>35.1       | 8.23<br>8.23 | 8                       |
| 101<br>102 | 608<br>609  | 100          | r                  | p<br>n         | 5/ 7/29<br>5/ 9/29 | <b>25.</b> 2        | 35.0               | 8.24         |                         |
| 102        | 610         | 50           | r                  | n              | 5/ 9/29            | 25.8                | 35.0               | 8.24         | 8                       |
| 102        | 611         | 100          | r                  | n              | 5/ 9/29            | 25.6                | 35.0               | 8.23         | 8                       |
| 103        | 615         | 0            | oc                 | n              | 5/11/29            | 26.0                | 35.0               | 8.25         | 5                       |
| 103        | 617         | 100          | oc                 | n              | 5/11/29            | 24.8                | 35.2               | 8.25         | 5<br>5<br>7             |
| 104        | 621         | 1.00         | r                  | n              | 5/13/29<br>5/13/29 | 26.1<br>25.3        | 35.2<br>35.3       | 8.24<br>8.21 | 7                       |
| 104<br>105 | 623<br>627  | 100<br>50    | oc<br>oc           | n<br>n         | 5/15/29            | 26.8                | 34.9               | 8.23         | 5                       |
| 105        | 628         | 50           | r                  | n              | 5/15/29            | 26.8                | 34.9               | 8.23         | 5                       |
| 106        | 633         | 0            | r                  | n              | 5/17/29            | 27.2                | 35.0               | 8.23         | 5                       |
| 106        | 634         | 50           | r                  | n              | 5/17/29            | 27.0                | 35.0               | 8.23         | 5<br>5<br>5             |
| 106        | 635         | 100          | r                  | n              | 5/17/29            | 25.6                | 35.1               | 8.23         | 5                       |
| 107        | 639         | 50           | c                  | n              | 5/19/29<br>5/19/29 | 28.0<br>27.9        | 34.4<br>34.4       | 8.23<br>8.23 | 5<br>4                  |
| 107<br>107 | 640<br>641  | 50<br>100    | c<br>r             | n<br>n         | 5/19/29            | 26.8                | 34.4               | 8.23         | 11                      |
| 107        | 642         | 0            | r                  | p              | 5/19/29            | 28.0                | 34.4               | 8.23         | 11<br>5<br>4<br>3<br>5  |
| 108        | 648         | 100          | oc                 | n              | 5/27/29            | 25.2                | 35.0               | 8.23         | 4                       |
| 109        | 655         | 50           | r                  | n              | 5/29/29            | 23.1                | 35.0               | 8.22         | 3                       |
| 109        | 656         | 100          | oc                 | n              | 5/29/29            | 19.4                | 34.8               | 8.18         | 5 7                     |
| 112        | 674         | 0            | oc                 | n              | 6/ 5/29<br>6/ 5/29 | 23.2<br>21.7        | 34.6<br>34.6       | 8.22<br>8.23 | 7                       |
| 112        | 675<br>676  | 50           | oc                 | n<br>n         | 6/ 5/29            | 19.8                | 34.7               | 8.20         | 8                       |
| 112<br>113 | 676<br>680  | 100          | r<br>oc            | n              | 6/25/29            | 24.2                | 34.5               | 8.25         | 8<br>5<br>5             |
| 113        | 681         | 50           | oc                 | n              | 6/25/29            | 23.8                | 34.6               | 8.25         | 5                       |
| 113        | 682         | 100          | oc                 | n              | 6/25/29            | 21.5                | 34.7               | 8.23         | 8                       |
| 128        | 779         | 0            | ос                 | n              | 7/25/29            | 16.4                | 33.0               | 8.12         | 29                      |
| 129        | 780         | 0            | c                  | n              | 7/27/29            | 16.3                | 33.1               | 8.13         | 25                      |
| 130        | 787         | 0            | ос                 | n              | 9/4/29             | 16.2                | 33.4<br>33.4       | 8.34<br>8.32 | 36                      |
| 131        | 789<br>792  | 100          | oc                 | n              | 9/ 6/29<br>9/ 6/29 | 12.1<br>19.3        | 33.4               | 8.34         | •••                     |
|            | 797         | 0            | r                  | p              |                    | 10.0                |                    |              |                         |
| 131<br>131 | 793         | 0            | r                  | p              | 9/ 6/29            | 19.3                | 33.4               | 8.34         | 36                      |

Table 45. Distributional and environmental records for Ceratium carriense--Continued

|            | Υ          |           |                    | ,      |                      |              |              |              |                       |
|------------|------------|-----------|--------------------|--------|----------------------|--------------|--------------|--------------|-----------------------|
| Station    | Sample     | Depth (m) | Relative abundance | Appa-  |                      | Temperature  | Salinity     | pН           | PO <sub>4</sub>       |
|            | L          | (111)     | abundance          | ratus  |                      | (°C)         | (0/00)       |              | mg/m <sup>3</sup>     |
| 132        | 798        | 50        | oc                 | n      | 9/ 8/29              | 17.6         | 33.9         | 8.33         | 19                    |
| 132        | 799        | 100       | r                  | n      | 9/ 8/29              | 14.3         | 33.4         | 8.30         | 16                    |
| 132        | 801        | 0         | r                  | р      | 9/ 8/29              | 21.0         | 33.9         | 8.34         | 15                    |
| 132        | 802        | 50        | r                  | p      | 9/ 8/29              | 17.6         | 33.9         | 8.33         | 19                    |
| 132        | 803        | 100       | r                  | p      | 9/ 8/29              | 14.3         | 33.4         | 8.30         | 16                    |
| 133<br>133 | 804<br>805 | 0<br>50   | oc                 | n      | 9/10/29              | 22.7         | 34.7         | 8.47         | 7<br>7                |
| 133        | 806        | 100       | r                  | n<br>n | 9/10/29<br>9/10/29   | 20.8<br>18.4 | 34.7         | 8.37         | 7                     |
| 134        | 808        | 0         | r                  | n      | 9/12/29              | 22.9         | 34.8<br>34.7 | 8.31<br>8.34 | 7<br>6                |
| 134        | 809        | 50        | r                  | n      | 9/12/29              | 19.8         | 34.6         | 8.34         | 6                     |
| 134        | 810        | 100       | oc                 | n      | 9/12/29              | 18.1         | 34.6         | 8.34         | 6<br>6<br>7           |
| 135        | 820        | 0         | r                  | n      | 9/14/29              | <b>23.</b> 8 | 35.1         | 8.37         |                       |
| 135        | 821        | 50        | ос                 | n      | 9/14/29              | 21.5         | 35.0         | 8.37         | 5                     |
| 135<br>135 | 822<br>824 | 100       | r                  | n      | 9/14/29              | 18.7         | 34.8         | 8.34         | 5<br>5<br>7<br>3<br>3 |
| 136        | 827        | 0         | r<br>oc            | p<br>n | 9/14/29<br>9/16/29   | 23.8<br>24.6 | 35.1<br>35.4 | 8.37<br>8.37 | 7                     |
| 136        | 828        | 50        | oc                 | n      | 9/16/29              | 21.4         | 35.1         | 8.39         | 3                     |
| 137        | 836        | 0         | c                  | n      | 9/18/29              | 25.5         | 35.0         | 8.39         | 4                     |
| 137        | 837        | 50        | С                  | n      | 9/18/29              | 24.4         | 35.1         | 8.34         | 4<br>4<br>5           |
| 137        | 838        | 100       | r                  | n      | 9/18/29              | 21.5         | 35.1         | 8.30         | 5                     |
| 137        | 840        | 0         | r                  | p      | 9/18/29              | 25.5         | 35.0         | 8.39         | 4                     |
| 138        | 843        | 0         | oc                 | n      | 9/20/29              | 26.1         | 34.8         | 8.35         | 5                     |
| 138<br>138 | 844<br>845 | 50<br>100 | oc                 | n      | 9/20/29<br>9/20/29   | 25.6         | 34.7         | 8.30         | 3                     |
| 138        | 847        | 0         | oc<br>r            | n      | 9/20/29              | 22.2<br>26.1 | 34.8<br>34.8 | 8.31         | 3<br>3<br>5           |
| 139        | 849        | 0         | oc                 | p<br>n | 9/22/29              | 26.7         | 34.8         | 8.35<br>8.34 | ა<br>6                |
| 139        | 850        | 50        | oc                 | n      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6                     |
| 140        | 856        | 0         | С                  | n      | 10/ 3/29             | 26.9         | 35.0         | 8.42         | 7                     |
| 140        | 857        | 50        | oc                 | n      | 10/ 3/29             | 26.9         | 35.0         | 8.39         | 7                     |
| 140        | 858        | 100       | r                  | n      | 10/ 3/29             | 25.5         | 35.0         | 8.34         | 7                     |
| 140        | 861        | 50        | r                  | р      | 10/ 3/29             | 26.9         | 35.0         | 8.39         | 7<br>5<br>5           |
| 141<br>141 | 864<br>865 | 0<br>50   | r                  | n      | 10/ 5/29<br>10/ 5/29 | 25.9         | 35.2         | 8.34         | 5                     |
| 141        | 870        | 50        | r                  | n      | 10/ 5/29<br>10/ 5/29 | 24.8<br>24.8 | 35.3<br>35.3 | 8.34<br>8.34 | 5<br>5                |
| 142        | 873        | 50        | r                  | p<br>n | 10/ 7/29             | 21.8         | 34.8         | 8.30         | 5                     |
| 142        | 874        | 100       | r                  | n      | 10/ 7/29             | 16.6         | 34.4         | 8.27         | . 5                   |
| 142        | 877        | 50        | r                  | p      | 10/ 7/29             | 21.8         | 34.8         | 8.30         | 5                     |
| 143        | 881        | 0         | С                  | n      | 10/ 9/29             | 22.4         | 34.4         | 8.30         | 5<br>6                |
| 143        | 882        | 50        | oc                 | n      | 10/ 9/29             | 19.0         | 34.2         | 8.34         | 6                     |
| 143<br>143 | 883<br>884 | 100       | oc                 | n      | 10/ 9/29             | 13.8         | 34.1         | 8.30         | 10                    |
| 145        | 890        | 0         | r                  | p<br>n | 10/ 9/29<br>10/13/29 | 22.4<br>22.3 | 34.4<br>34.6 | 8.30<br>8.29 | 6                     |
| 145        | 891        | 50        | r                  | n      | 10/13/29             | 18.7         | 34.3         | 8.34         | 6                     |
| 145        | 892        | 100       | r                  | n      | 10/13/29             | 16.0         | 34.1         | 8.31         | 6                     |
| 147        | 904        | 50        | $\mathbf{r}$       | n      | 10/17/29             | 23.1         | 35.3         | 8.29         | 5                     |
| 148        | 910        | 0         | oc                 | n      | 10/19/29             | 23.4         | 35.2         |              | • • •                 |
| 148        | 911        | 50        | oc                 | n      | 10/19/29             | 23.0         | 35.1         | ****         | • • •                 |
| 148<br>148 | 912<br>917 | 100       | oc                 | n      | 10/19/29             | 20.0<br>23.4 | 35.0<br>35.2 | ****         | •••                   |
| 149        | 920        | 0         | r<br>c             | p<br>n | 10/19/29<br>10/21/29 | 23.4         | 35.2<br>35.0 | 8.34         | 6                     |
| 149        | 921        | 50        | oc                 | n      | 10/21/29             | 23.3         | 35.0         | 8.37         | 6                     |
| 150        | 929        | 0         | r                  | n      | 10/23/29             | 25.6         | 34.7         | 8.39         | 6                     |
| 150        | 931        | 100       | r                  | n      | 10/23/29             | 19.6         | 34.6         | 8.32         | 11                    |
| 151        | 938        | 50        | oc                 | n      | 10/26/29             | 18.3         | 34.4         |              | ***                   |
| 151        | 939        | 100       | oc                 | n      | 10/26/29             | 12.5         | 34.6         |              | ***                   |
| 151<br>152 | 942<br>945 | 50<br>50  | r                  | p      | 10/26/29             | 18.3<br>14.2 | 34:4<br>34.5 | 7.87         | 53                    |
| 153        | 951        | 0         | oc<br>oc           | n<br>n | 10/27/29<br>10/29/29 | 28.1         | 34.2         | 8.47         | 7                     |
| 153        | 952        | 50        | oc                 | n      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                     |
| 153        | 953        | 100       | r                  | n      | 10/29/29             | 20.5         | 34.7         | 8.28         | 31                    |
| 153        | 955        | 0         | r                  | p      | 10/29/29             | 28.1         | 34.2         | 8.47         | 7                     |
| 153        | 956        | 50        | r                  | p      | 10/29/29             | 28.1         | 34.4         | 8.39         | 7                     |
| 153        | 957        | 100       | r                  | p      | 10/29/29             | 20.5         | 34.7         | 8.28         | 31                    |
| 154<br>154 | 958<br>959 | 0<br>50   | r                  | n      | 10/31/29             | 28.3         | 34.2         | 8.39<br>8.40 | 7                     |
| 154        | 960        | 100       | r                  | n<br>n | 10/31/29<br>10/31/29 | 28.2<br>25.3 | 34.2<br>34.8 | 7.93         | 7<br>21               |
| 155        | 965        | 0         | c                  | n      | 11/ 2/29             | 27.8         | 34.9         | 8.29         | 29                    |
| 155        | 966        | Ŏ         | oc                 | n      | 11/ 2/29             | 27.8         | 34.9         | 8.29         | 29                    |
| 155        | 967        | 100       | r                  | n      | 11/ 2/29             | 27.2         | 35.0         | 8.30         | 35                    |
| 156        | 972        | 0         | oc                 | n      | 11/ 4/29             | 27.6         | 35.0         | 8.34         | 28                    |
| 156        | 973        | 0         | r                  | p      | 11/ 4/29             | 27.6         | 35.0         | 8.34         | 28                    |
| 156        | 974        | 100       | ос                 | n      | 11/ 4/29             | 26.4         | 35.1         | 8.30         | 48                    |
| 157        | 978        | 0         | oc                 | n      | 11/6/29              | 27.1         | 35.3<br>35.2 | 8.27<br>8.32 | 47<br>60              |
| 157<br>157 | 979<br>980 | 50<br>100 | oc                 | n<br>n | 11/ 6/29<br>11/ 6/29 | 27.1<br>26.8 | 35.5         | 8.30         | 64                    |
| 158        | 983        | 0         | c                  | n      | 11/ 8/29             | 28.2         | 35.6         | 8.34         | 36                    |
| 100        | 000        |           |                    | 44     | 22/ 0/20             | 20.2         |              | 717.         |                       |

Table 45. Distributional and environmental records for Ceratium carriense--Concluded

| Station | Sample | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | рН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|-----------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 158     | 984    | 50        | oc                    | n              | 11/ 8/29 | 28.2                | 35.6               | 8.39 | 50                                   |
| 158     | 985    | 100       | oc                    | n              | 11/ 8/29 | 27.6                | 35.9               | 8.39 | 48                                   |
| 159     | 990    | 0         | oc                    | n              | 11/11/29 | 28.6                | 35.7               | 8.37 | 15                                   |
| 159     | 991    | 50        | oc                    | n              | 11/11/29 | 28.5                | 35.7               | 8.39 | 15                                   |
| 159     | 992    | 100       | Г                     | n              | 11/11/29 | 28.0                | 35.7               | 8.37 | 23                                   |
| 160     | 1000   | 0         | oc                    | n              | 11/13/29 | 28.6                | 35.6               | 8.37 | 12                                   |
| 160     | 1002   | 50        | oc                    | n              | 11/13/29 | 28.6                | 35.6               | 8.39 | 15                                   |
| 160     | 1003   | 100       | ос                    | n              | 11/13/29 | 28.5                | 35.7               | 8.44 | 16                                   |

Table 46. Distributional and environmental records for Cerațium contrarium

|          | Table 40         |           | ibutional and      | JII V 21 (J1111 | remail rece               | rus ior cerașii     | im contrar         | a contract   |  |
|----------|------------------|-----------|--------------------|-----------------|---------------------------|---------------------|--------------------|--------------|--|
| Station  | Sample           | Depth (m) | Relative abundance | Appa-<br>ratus  | Date                      | Temperature<br>(°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub><br>mg/m <sup>3</sup>       |
| 1        | 1                | 0         | ос                 | n               | 5/12/28                   | 24.0                | 36.2               | 8.16         | 34   |
| î        | 1<br>2<br>3<br>4 | 70        | r                  | n               | 5/12/28                   | (22.4               | 36.4               | 8.17         | 35)  |
| îа       | 3                | ő         | oc                 | n               | 5/14/28                   | (22.3               | 36.3               | 8.20         | 46)  |
| 1a       | 4                | 0         | C                  | n               | 5/14/28                   | (22.3               | 36.3               | 8.20         | 46)  |
| 1a       | 5                | 0         | С                  | n               | 5/14/28                   | (22.3               | 36.3               | 8.20         | 46)  |
| 1b       | 6                | 0         | 90                 | n               | 5/16/28                   | (22.3               | 36.3               | 8.20         | 46)  |
| 1b       | 7                | 50        | r                  | n               | 5/16/28                   | (22.2               | 36.4<br>36.4       | 8.21<br>8.23 | 39)<br>58                                  |
| 2<br>15  | 14<br>97         | 0         | c<br>c             | n               | 5/18/28<br>8/11/28        | 20.5<br>24.8        | 36.4               | 8.21         | 11   |
| 15       | 98               | 50        | r                  | p<br>p          | 8/11/28                   | 19.8                | 36.5               | 8.21         | 8  |
| 15       | 99               | 100       | c                  | p               | 8/11/28                   | 18.4                | 36.4               | 8.20         | 19   |
| 15       | 100              | 0         | oc                 | 'n              | 8/11/28                   | 24.8                | 36.4               | 8.21         | 11   |
| 15       | 101              | 50        | oc                 | n               | 8/11/28                   | 19.8                | 36.5               | 8.21         | 8  |
| 15       | 102              | 100       | r                  | n               | 8/11/28                   | 18.4                | 36.4               | 8.20         | 19   |
| 16       | 103<br>106       | 0         | r                  | p               | 8/13/28                   | 25.9<br>25.9        | 36.2<br>36.2       | 8.24<br>8.24 | 8  |
| 16<br>16 | 108              | 100       | r<br>oc            | n<br>n          | 8/13/28<br>8/13/28        | 19.9                | 36.5               | 8.17         | 13   |
| 17       | 109              | 0         | r                  | р               | 8/15/28                   | 26.2                | 36.6               | 8.29         | 9  |
| 17       | 110              | 50        | oc                 | p               | 8/15/28                   | 21.9                | 36.6               | 8.28         | 12   |
| 17       | 111              | 0         | r                  | n               | 8/15/28                   | 26.2                | 36.6               | 8.29         | 9  |
| 17       | 112              | 50        | oc                 | n               | 8/15/28                   | 21.9                | 36.6               | 8.28         | 12   |
| 17       | 113              | 100       | r                  | n               | 8/15/28                   | 19.3                | 36.5               | 8.23         | 9  |
| 18       | 114              | 0         | oc                 | p               | 8/17/28                   | 27.0                | 37.0               | 8.23         | 12<br>9<br>5<br>5<br>5                     |
| 18<br>18 | 115<br>117       | 50<br>0   | oc<br>c            | p<br>n          | 8/17/28<br>8/17/28        | 22.4<br>27.0        | 36.8<br>37.0       | 8.24<br>8.23 | 5  |
| 18       | 118              | 50        | c                  | n               | 8/17/28                   | 22.4                | 36.8               | 8.24         | 5  |
| 19       | 120              | Õ         | oc                 | p               | 8/20/28                   | 26.6                | 37.0               | 8.34         | 5  |
| 19       | 121              | 50        | r                  | p               | 8/20/28                   | 25.2                | 37.1               | 8.27         | 5  |
| 19       | 122              | 0         | С                  | n               | 8/20/28                   | 26.6                | 37.0               | 8.34         | 5  |
| 19       | 123              | 50        | C                  | n               | 8/20/28                   | 25.2                | 37.1               | 8.27         | 5  |
| 19       | 124              | 100       | o'c                | n               | 8/20/28<br>8/22/28        | 22.4<br>26.0        | 37.0<br>36.6       | 8.25<br>8.37 | 5  |
| 20<br>20 | 125<br>126       | 0<br>50   | oc                 | p<br>p          | 8/22/28                   | 25.8                | 36.6               | 8.26         | 3  |
| 20       | 127              | 100       | r                  | p               | 8/22/28                   | 22.6                | 36.7               | 8.19         | 5  |
| 20       | 128              | 0         | c                  | n               | 8/22/28                   | 26.0                | 36.6               | 8.37         | 5  |
| 20       | 129              | 50        | С                  | n               | 8/22/28                   | 25.8                | 36.6               | 8.26         | 3  |
| 20       | 130              | 100       | С                  | n               | 8/22/28                   | 22.6                | 36.7               | 8.19         | 5  |
| 20-21    | 131              | 0         | oc                 | n               | 8/23/28                   | (26.6<br>26.6       | 36.3<br>36.3       | 8.32<br>8.32 | 4)   |
| 21<br>21 | 135<br>136       | 0<br>50   | c<br>oc            | n<br>n          | 8/24/28<br>8/24/28        | 24.4                | 36.2               | 8.26         | 4  |
| 21       | 137              | 100       | oc                 | n               | 8/24/28                   | 21.0                | 36.8               | 8.20         | 55555555555555555555555555555555555555     |
| 22       | 139              | 0         | oc                 | p               | 8/27/28                   | 26.7                | 36.0               | 8.26         | 8  |
| 22       | 142              | 0         | oc                 | n               | 8/27/28                   | 26.7                | 36.0               | 8.26         | 8  |
| 22       | 143              | 50        | oc                 | n               | 8/27/28                   | 24.5                | 36.2               | 8.21         | 9  |
| 23       | 148              | 0         | r                  | n               | 8/29/28                   | 27.2<br>20.9        | 35.9<br>36.0       | 8.25<br>8.14 | 13   |
| 23<br>25 | 149<br>161       | 50<br>50  | r                  | n<br>n          | 8/29/28<br>9/ <b>3/28</b> | 21.5                | 36.0               | 8.22         | 12   |
| 27       | 168              | 50        | r                  | p               | 9/ 7/28                   | 26.0                | 36.2               | 8.30         | 4  |
| 28       | 174              | 50        | oc                 | p               | 9/11/28                   | 26.7                | 36.3               | 8.26         | 4  |
| 28       | 176              | 0         | oc                 | n               | 9/11/28                   | 27.6                | 36.3               | 8.29         | 4  |
| 28       | 177              | 50        | r                  | n               | 9/11/28                   | 26.7                | 36.3               | 8.26         | 4  |
| 28       | 178              | 100       | r                  | n               | 9/11/28                   | 22.8                | 36.3<br>36.2       | 8.22         | 3  |
| 29       | 183<br>188       | 50<br>0   | r                  | n<br>n          | 9/13/28<br>9/15/28        | 27.2<br>28.0        | 36.2               | 8.30         | 2  |
| 30<br>30 | 188              | 50        | r<br>oc            | n               | 9/15/28                   | 27.8                | 36.1               | 8.29         | 3  |
| 31       | 192              | 50        | oc                 | n               | 10/3/28                   | 28.2                | 35.4               | 8.23         | 2  |
| 35       | 203              | 0         | c                  | n               | 10/26/28                  | 27.4                | 29.7               | 8.31         | 4<br>4<br>4<br>7<br>3<br>2<br>3<br>2<br>15 |
| 35       | 206              | 0         | c                  | p               | 10/26/28                  | 27.4                | 29.7               | 8.31         | 15   |
| 35a      | 208              | 0         | ос                 | n               | 10/26/28                  | (27.4               | 29.7               | 8.31         | 15)  |

Table 46. Distributional and environmental records for Ceratium contrarium--Continued

|                |                    | Donth           | Delati                | T 4            |                      | m                   | 0-11 11            |              | 7.0                                  |
|----------------|--------------------|-----------------|-----------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| Station        | Sample             | Depth<br>(m)    | Relative<br>abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 35-36          | 212                | 0               | r                     | n              | 10/28/28             | (27.0               | 30.7               | 8.27         | 16)                                  |
| 36<br>36       | 213<br>216         | 0               | oc                    | n              | 10/30/28             | 26.5                | 31.6               | 8.23         | 16                                   |
| 37             | 219                | 100             | oc<br>r               | p<br>n         | 10/30/28<br>11/ 1/28 | 26.5<br>15.1        | 31.6<br>34.9       | 8.23<br>7.82 | 16<br>153                            |
| 37             | 220                | 0<br>50         | r                     | p              | 11/ 1/28             | 27.1                | 31.7               | 8.28         | 15                                   |
| 37<br>41       | 221<br>235         | 0               | oc<br>r               | p<br>n         | 11/ 1/28<br>11/10/28 | 18.8<br>20.4        | 34.5<br>34.2       | 8.00<br>8.11 | 121<br>32                            |
| 41a            | 240                | 0               | r                     | n              | 11/12/28             | (18.7               | 34.7               | 8.06         | 45)                                  |
| 42<br>43       | 241<br>246         | 0<br>100        | r                     | n<br>n         | 11/13/28<br>11/15/28 | 18.7<br>13.6        | 34.7<br>35.0       | 8.06<br>7.90 | 45<br>92                             |
| 44             | 250                | 0               | r                     | n              | 11/17/28             | 20.7                | 34.9               | 8.03         | 38                                   |
| 45<br>45       | 256<br>257         | 0<br>50         | c<br>oc               | n<br>n         | 11/19/28<br>11/19/28 | 22.4<br>22.4        | 35.3<br>35.2       | 8.12<br>8.13 | 38<br>46                             |
| 45             | <b>25</b> 8        | 100             | oc                    | n              | 11/19/28             | 18.6                | 35.1               | 8.00         | 50                                   |
| 45<br>45       | 259<br>260         | 0<br>50         | r                     | p<br>p         | 11/19/28<br>11/19/28 | 22.4<br>22.4        | 35.3<br>35.2       | 8.12<br>8.13 | 38<br>46                             |
| 46             | 261                | 0               | oc                    | n              | 11/21/28             | 23.3                | 35.3               | 8.16         | 36                                   |
| 46<br>46       | 262<br>263         | 50<br>100       | oc<br>r               | n<br>n         | 11/21/28<br>11/21/28 | 23.2<br>22.5        | 35.3<br>35.4       | 8.16<br>8.17 | 40<br>40                             |
| 46             | 264                | 0               | r                     | p              | 11/21/28             | 23.3                | 35.3               | 8.16         | 36                                   |
| 46<br>46       | 264<br>265         | 0<br>50         | oc<br>r               | p<br>p         | 11/21/28<br>11/21/28 | 23.3<br>23.2        | 35.3<br>35.3       | 8.16<br>8.16 | 36<br>40                             |
| 47             | 266                | 0               | r                     | n              | 11/23/28             | 23.9                | 36.0               | 8.23         | 17                                   |
| 47<br>47       | 267<br>268         | 50<br>100       | oc<br>oc              | n<br>n         | 11/23/28<br>11/23/28 | 23.8<br>22.7        | 36.0<br>36.2       | 8.23<br>8.23 | 20<br>20                             |
| 47<br>47       | 269<br><b>27</b> 0 | 0<br>50         | oc<br>r               | p              | 11/23/28<br>11/23/28 | 23.9<br>23.8        | 36.0<br>36.0       | 8.23<br>8.23 | 17<br>20                             |
| 48             | 271                | 0               | c                     | p<br>n         | 11/25/28             | 23.6                | 36.4               | 8.23         | 13                                   |
| 48<br>48       | 272<br>273         | 50<br>100       | oc<br>c               | n<br>n         | 11/25/28<br>11/25/28 | 23.6<br>22.7        | 36.4<br>36.3       | 8.24<br>8.26 | 16<br>16                             |
| 48             | 274                | 0               | oc                    | p              | 11/25/28             | 23.6                | 36.4               | 8.23         | 13                                   |
| 48<br>48       | 275<br>276         | 50<br>100       | oc<br>r               | p<br>p         | 11/25/28<br>11/25/28 | 23.6<br>22.7        | 36.4<br>36.3       | 8.24<br>8.26 | 16<br>16                             |
| 49             | 277                | 0               | oc                    | n              | 11/27/28             | 23.4                | 36.2               | 8.27         | 13                                   |
| 49<br>49       | 278<br>279         | 50<br>100       | c<br>c                | n<br>n         | 11/27/28<br>11/27/28 | 22.6<br>21.6        | 36.1<br>35.9       | 8.26<br>8.26 | 13<br>13                             |
| 49<br>49       | 280<br>281         | 0<br><b>5</b> 0 | r                     | p              | 11/27/28<br>11/27/28 | 23.4<br>22.6        | 36.2<br>36.1       | 8.27<br>8.26 | 13<br>13                             |
| 49             | 282                | 100             | oc<br>r               | p<br>p         | 11/27/28             | 21.6                | 35.9               | 8.26         | 13                                   |
| 49a<br>50      | 283<br>284         | 0               | oc<br>c               | n<br>n         | 11/28/28<br>11/29/28 | (23.2<br>23.2       | 36.0<br>36.0       | 8.23<br>8.23 | 13)<br>13                            |
| 50             | 285                | 50              | oc                    | n              | 11/29/28             | 22.0                | 35.9               | 8.23         | 13                                   |
| 50<br>50       | 286<br>289         | 100<br>100      | c<br>oc               | n<br>p         | 11/29/28<br>11/29/28 | 20.5<br>20.5        | 35.7<br>35.7       | 8.22<br>8.22 | 13<br>13                             |
| 50-51          | 290<br>291         | 0               | oc                    | n              | 11/30/28<br>11/30/28 | (22.8<br>(22.8      | 35.6<br>35.6       | 8.22<br>8.22 | 16)<br>16)                           |
| 50-51<br>50-51 | 292                | 0               | oc<br>oc              | n<br>n         | 11/30/28             | (22.8               | 35.6               | 8.22         | 16)                                  |
| 51<br>51       | 293<br>294         | 0<br><b>50</b>  | oc<br>oc              | n<br>n         | 12/ 1/28<br>12/ 1/28 | 22.8<br>20.5        | 35.6<br>35.6       | 8.22<br>8.22 | 16<br>17                             |
| 51             | 297                | 50              | r                     | p              | 12/ 1/28             | 20.5                | 35.6               | 8.22         | 17                                   |
| 51<br>54       | 298<br>320         | 100<br>50       | r<br>oc               | p<br>n         | 12/ 1/28<br>12/14/28 | 20.0<br>19.8        | 35.6<br>35.4       | 8.22<br>8.18 | 17<br>17                             |
| 54             | 321                | 100             | oc                    | n              | 12/14/28             | 18.7                | 35.4               | 8.16         | 20                                   |
| 55<br>55       | 323<br>325         | 0<br>100        | oc<br>oc              | n<br>n         | 12/16/28<br>12/16/28 | 20.4<br>16.7        | 34.9<br>34.9       | 8.19<br>7.17 | 12<br>12                             |
| 55             | 326                | 0               | r                     | p              | 12/16/28             | 20.4                | 34.9               | 8.19         | 12                                   |
| 55<br>56       | 327<br>328         | 50<br>0         | r<br>c                | p<br>n         | 12/16/28<br>12/18/28 | 18.7<br>20.8        | 35.0<br>34.9       | 8.18<br>8.13 | 12<br>9                              |
| 56             | 330<br>331         | 100             | oc                    | n              | 12/18/28<br>12/18/28 | 16.6<br>20.8        | 34.8<br>34.9       | 8.11<br>8.13 | 12<br>9                              |
| 56<br>56       | 332                | 0<br>50         | oc<br>oc              | p<br>p         | 12/18/28             | 18.5                | 35.1               | 8.14         | 9                                    |
| 56<br>56-57    | 333<br>334         | 100<br>0        | r<br>c                | p<br>n         | 12/18/28<br>12/19/28 | 16.6<br>(19.0       | 34.8<br>34.5       | 8.11<br>8.14 | 12<br>20)                            |
| 57             | 335                | 0               | С                     | n              | 12/20/28             | 19.0                | 34.5               | 8.14         | 20                                   |
| 57<br>57       | 336<br>338         | 50<br>0         | oc<br>oc              | n<br>p         | 12/20/28<br>12/20/28 | 15.6<br>19.0        | 34.3<br>34.5       | 8.14<br>8.14 | 21<br>20                             |
| 57             | 339                | 50              | r                     | p              | 12/20/28             | 15.6<br>14.3        | 34.3<br>34.4       | 8.14<br>8.10 | 21<br>40                             |
| 57<br>58       | 340<br>346         | 100<br>100      | r                     | p<br>p         | 12/20/28<br>12/22/28 | 12.3                | 34.1               | 8.05         | 40                                   |
| 59             | 349<br>351         | 50<br>0         | r                     | n              | 12/24/28<br>12/24/28 | 14.0<br>16.3        | 34.0<br>34.0       | 8.08<br>8.10 | 38<br>38                             |
| 59<br>60       | 355                | 50              | r                     | p<br>n         | 12/26/28             | 13.4                | 34.0               | 8.06         | 54                                   |
| 60-61<br>61    | 360<br>363         | 0               | r<br>oc               | n<br>n         | 12/26/28<br>12/28/28 | (15.0<br>16.9       | 34.0<br>34.0       | 8.07<br>8.05 | 50)<br>46                            |
| 61             | 366                | 0               | r                     | p              | 12/28/28             | 16.9                | 34.0               | 8.05         | 46<br>46)                            |
| 61-62          | 369                | 0               | r                     | n              | 12/28/28             | (16.9               | 34.0               | 8.05         | 40)                                  |

Table 46. Distributional and environmental records for Ceratium contrarium--Continued

|                          |            | D- 41-          | D-1-1/                |                |                      |                     | 0.11.11            |              |                                      |
|--------------------------|------------|-----------------|-----------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|
| Station                  | Sample     | Depth (m)       | Relative<br>abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
| 61-62                    | 370        | 0               | oc                    | n              | 12/28/28             | (16.9               | 34.0               | 8.05         | 46)                                  |
| 62                       | 371        | 0               | oc                    | n              | 12/30/28             | 19.2                | 34.2               | 8.12         | 32                                   |
| 62<br>62                 | 372<br>373 | 50<br>100       | r                     | n<br>n         | 12/30/28<br>12/30/28 | 16.2<br>13.1        | 34.3<br>34.2       | 8.10<br>8.06 | 28<br>48                             |
| 62                       | 376        | 100             | r                     | p              | 12/30/28             | 13.1                | 34.2               | 8.06         | 48                                   |
| 62-63<br>63              | 378<br>379 | 0               | r<br>oc               | n<br>n         | 12/31/28 1/ 1/29     | (20.5<br>20.5       | 34.6               | 8.07<br>8.07 | 21)<br>21                            |
| 63                       | 380        | 50              | oc                    | n              | 1/ 1/29              | 17.0                | 34.6               | 8.08         | 25                                   |
| 63<br>63                 | 381<br>382 | 100<br>0        | r                     | n              | 1/ 1/29              | 15.6                | 34.6<br>34.6       | 8.08         | 24<br>21                             |
| 63                       | 383        | 50              | r                     | p<br>p         | 1/ 1/29<br>1/ 1/29   | 20.5<br>17.0        | 34.6               | 8.07<br>8.08 | 25                                   |
| 63-64<br>63-64           | 385<br>386 | 0               | r                     | n              | 1/ 1/29<br>1/ 1/29   | (20.5<br>(20.5      | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)                           |
| 63-64                    | 387        | 0               | oc<br>oc              | n<br>n         | 1/ 2/29              | (20.5               | 34.6               | 8.07         | 21)                                  |
| 63-64<br>63-64           | 388<br>390 | 0               | oc                    | n<br>n         | 1/ 2/29<br>1/ 2/29   | (20.5<br>(20.5      | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)                           |
| 63-64                    | 391        | 0               | oc<br>oc              | n              | 1/ 3/29              | (20.5               | 34.6               | 8.07         | 21)                                  |
| 63-64<br>63-64           | 392<br>393 | 0               | oc<br>r               | n<br>n         | 1/ 3/29<br>1/ 3/29   | (20.5<br>(20.5      | 34.6<br>34.6       | 8.07<br>8.07 | 21)<br>21)                           |
| 64                       | 394        | 0               | r                     | n              | 1/ 3/29              | 20.6                | 34.6               | 8.12         | 21                                   |
| 64<br>64                 | 395<br>396 | 50<br>100       | r                     | n<br>n         | 1/ 3/29<br>1/ 3/29   | 17.2<br>15.8        | 34.6<br>34.5       | 8.12<br>8.10 | 29<br>32                             |
| 64                       | 398        | 0               | r                     | p              | 1/ 3/29              | 20.6                | 34.6               | 8.12         | 21                                   |
| 64-65<br>64-65           | 401<br>402 | 0               | oc<br>r               | n<br>n         | 1/ 3/29<br>1/ 4/29   | (20.6<br>(20.6      | 34.6<br>34.6       | 8.12<br>8.12 | 21)<br>21)                           |
| 64-65                    | 403        | 0               | oc                    | n              | 1/4/29               | (20.6               | 34.6               | 8.12         | 21)                                  |
| 64-65<br>65              | 404<br>405 | 0               | r                     | n<br>n         | 1/ 4/29<br>1/ 5/29   | (20.6<br>20.2       | 34.6<br>34.5       | 8.12<br>8.10 | 21)<br>24                            |
| 65                       | 406        | 50              | r                     | n              | 1/ 5/29              | 16.5                | 34.5               | 8.10         | 25                                   |
| 65<br>65                 | 408<br>409 | 0<br>50         | r                     | p<br>p         | 1/ 5/29<br>1/ 5/29   | 20.2<br>16.5        | 34.5<br>34.5       | 8.10<br>8.10 | 24<br>25                             |
| 66                       | 411        | 0               | r                     | n              | 1/ 7/29              | 19.4                | 34.7               | 8.10         | 29                                   |
| 66<br>66                 | 413<br>414 | 0<br>50         | r                     | p<br>p         | 1/ 7/29<br>1/ 7/29   | 19.4<br>17.8        | 34.7<br>34.8       | 8.10<br>8.10 | 29<br>29                             |
| 67                       | 416        | 0               | oc                    | n              | 1/8/29               | 19.3                | 34.9               | 8.11         | 21                                   |
| 68<br>71                 | 419<br>441 | 0               | r                     | n<br>p         | 1/10/29<br>2/ 6/29   | 19.2<br>23.5        | 35.1<br>35.2       | 8.14<br>8.13 | 29<br>58                             |
| 73<br>74                 | 452<br>456 | 100<br>0        | oc                    | n              | 2/10/29<br>2/12/29   | 14.7<br>24.2        | 35.0<br>35.6       | 7.80<br>8.17 | 178<br>68                            |
| 74                       | 459        | 0               | oc<br>r               | n<br>p         | 2/12/29              | 24.2                | 35.6               | 8.17         | 68                                   |
| 75<br>76                 | 462<br>467 | 0               | r<br>oc               | n<br>n         | $\frac{2}{10}$       | 22.8<br>23.4        | 35.8<br>35.9       | 8.18<br>8.15 | 44<br>50                             |
| 76                       | 468        | 50              | r                     | n              | 2/16/29              | 22.1                | 35.9               | 8.14         | 42                                   |
| 76<br>77                 | 469<br>472 | 100<br>0        | oc                    | n ·            | 2/16/29<br>2/18/29   | 21.2<br>23.7        | 35.8<br>36.0       | 8.12<br>8.19 | 45<br>16                             |
| 77                       | 473        | 0               | ос                    | p              | 2/18/29<br>2/18/29   | 23.7<br>23.5        | 36.0<br>36.0       | 8.19<br>8.19 | 16<br>16                             |
| 77<br>78                 | 474<br>475 | 50<br>0         | oc<br>oc              | p<br>n         | 2/20/29              | 24.6                | 36.0               | 8.17         | 32                                   |
| 78<br>78                 | 476<br>477 | 50<br>100       | oc                    | n<br>n         | 2/20/29<br>2/20/29   | 23.8<br>21.9        | 36.1<br>36.2       | 8.14<br>8.14 | 32<br>34                             |
| 78                       | 478        | 0               | oc<br>oc              | p              | 2/20/29              | 24.6                | 36.0               | 8.17         | 32                                   |
| 78<br>79                 | 479<br>482 | 50<br>50        | oc<br>oc              | p<br>n         | 2/20/29<br>2/22/29   | 23.8<br>24.5        | 36.1<br>36.1       | 8.14<br>8.17 | 32<br>34                             |
| 79                       | 483        | 100             | oc                    | n              | 2/22/29              | 21.8                | 36.2               | 8.13         | 45                                   |
| 80<br>80                 | 486<br>488 | 0               | oc<br>oc              | n<br>p         | 2/24/29<br>2/24/29   | 26.0<br>26.0        | 35.9<br>35.9       | 8.20<br>8.20 | 36<br>36                             |
| 80                       | 489        | 50              | oċ                    | p              | 2/24/29              | 25.9                | 36.0<br>36.2       | 8.19         | 29<br>32                             |
| 80<br>81                 | 490<br>491 | 100             | r<br>c                | p<br>n         | 2/24/29<br>2/26/29   | 23.4<br>26.5        | 35.8               | 8.16<br>8.19 | 38                                   |
| 81                       | 492<br>493 | 50<br>0         | oc                    | n              | 2/26/29<br>2/26/29   | 26.4<br>26.5        | 35.9<br>35.8       | 8.19<br>8.19 | 38<br>38                             |
| 81<br>81                 | 494        | 50              | oc                    | p<br>p         | 2/26/29              | 26.4                | 35.9               | 8.19         | 38                                   |
| 81<br>8 <b>2</b>         | 495<br>496 | 100             | r<br>c                | p<br>n         | 2/26/29<br>2/28/29   | 23.6<br>27.2        | 36.2<br>36.3       | 8.18<br>8.21 | 36<br>34                             |
| 82                       | 497        | 50              | oc                    | n              | 2/28/29              | 27.2                | 36.3               | 8.21         | 34                                   |
| 8 <b>2</b><br>8 <b>3</b> | 498<br>501 | 0               | oc<br>c               | p<br>n         | 2/28/29<br>3/ 2/29   | 27.2<br>27.5        | 36.3<br>36.3       | 8.21<br>8.24 | 34<br>29                             |
| 83                       | 502        | 50              | С                     | n              | 3/ 2/29              | 27.4                | 36.5               | 8.24         | 25<br>29                             |
| 83<br>83                 | 503<br>504 | 0<br><b>5</b> 0 | r                     | p<br>p         | 3/ 2/29<br>3/ 2/29   | 27.5<br>27.4        | 36.3<br>36.5       | 8.24<br>8.24 | 25                                   |
| 84                       | 505        | 0               | С                     | n              | 3/ 4/29<br>3/ 4/29   | 27.8<br>27.5        | 36.2<br>36.4       | 8.23<br>8.21 | 24<br>24                             |
| 84<br>84                 | 506<br>507 | 50<br>0         | c<br>oc               | n<br>p         | 3/4/29               | 27.8                | 36.2               | 8.23         | 24                                   |
| 84                       | 508<br>510 | 50<br>0         | oc                    | p<br>n         | 3/ 4/29<br>3/ 6/29   | 27.5<br>27.9        | 36.4<br>36.2       | 8.21<br>8.22 | 24<br>40                             |
| 85<br>85                 | 511        | 50              | c<br>oc               | n              | 3/ 6/29              | 27.8                | 36.2               | 8.22         | 40                                   |

Table 46. Distributional and environmental records for Ceratium contrarium--Continued

| Station         Sample         Depth (m)         Relative abundance         Apparatus         Date         Temperature (°C)         Salinity (o/oo)         pl           85         512         0         r         p         3/6/29         27.9         36.2         8.2           85         513         50         oc         p         3/6/29         27.8         36.2         8.2           86         515         0         c         n         3/9/29         28.3         36.2         8.2           86         516         0         c         n         3/9/29         28.3         36.2         8.2           86         517         50         c         n         3/9/29         27.4         36.2         8.2           86         519         50         r         p         3/11/29         27.4         36.2         8.2           87         521         0         oc         n         3/11/29         27.8         36.1         8.2           87         522         50         c         n         3/11/29         27.8         36.1         8.2           87         523         0         oc         p | mg/m<br>  22   |
|---|--|
| 85 513 50 oc p 3/6/29 27.8 36.2 8.2 86 515 0 c n 3/8/29 (28.3 36.2 8.2 8.6 516 0 c n 3/9/29 28.3 36.2 8.2 86 516 0 c n 3/9/29 28.3 36.2 8.2 86 517 50 c n 3/9/29 27.4 36.2 8.2 86 519 50 r p 3/9/29 27.4 36.2 8.2 87 521 0 oc n 3/11/29 27.8 36.1 8.2 87 522 50 c n 3/11/29 27.8 36.1 8.2 87 522 50 c n 3/11/29 27.8 36.1 8.2 87 523 0 oc p 3/11/29 27.8 36.1 8.2 87 524 50 oc p 3/11/29 27.8 36.1 8.2 87 524 50 oc n 3/21/29 28.5 36.1 8.2 87 525 100 r p 3/11/29 26.5 36.1 8.2 87 525 100 r p 3/11/29 26.5 36.1 8.2 87 525 0 c n 3/23/29 28.6 35.8 8.2 89 529 50 c n 3/23/29 28.4 35.6 8.2 89 529 50 c n 3/23/29 28.4 35.6 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 89 533 0 c n 3/23/29 28.4 35.6 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 89 533 0 c n 3/23/29 28.4 35.6 8.2 89 533 0 c n 3/25/29 28.5 35.5 8.2 90 534 50 c p 3/25/29 28.6 35.8 5.5 8.2 90 535 0 oc p 3/25/29 28.5 35.5 8.2 90 536 50 oc p 3/25/29 28.5 35.5 8.2  | 22 40<br>22 40<br>29 20)<br>29 20<br>29 17<br>29 17<br>28 17 |
| 85 513 50 oc p 3/6/29 27.8 36.2 8.2 86 515 0 c n 3/8/29 (28.3 36.2 8.2 8.6 516 0 c n 3/9/29 28.3 36.2 8.2 86 516 0 c n 3/9/29 28.3 36.2 8.2 86 517 50 c n 3/9/29 27.4 36.2 8.2 86 519 50 r p 3/9/29 27.4 36.2 8.2 87 521 0 oc n 3/11/29 27.8 36.1 8.2 87 522 50 c n 3/11/29 27.8 36.1 8.2 87 522 50 c n 3/11/29 27.8 36.1 8.2 87 523 0 oc p 3/11/29 27.8 36.1 8.2 87 524 50 oc p 3/11/29 27.8 36.1 8.2 87 524 50 oc n 3/21/29 28.5 36.1 8.2 87 525 100 r p 3/11/29 26.5 36.1 8.2 87 525 100 r p 3/11/29 26.5 36.1 8.2 87 525 0 c n 3/23/29 28.6 35.8 8.2 89 529 50 c n 3/23/29 28.4 35.6 8.2 89 529 50 c n 3/23/29 28.4 35.6 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 89 533 0 c n 3/23/29 28.4 35.6 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 89 533 0 c n 3/23/29 28.4 35.6 8.2 89 533 0 c n 3/25/29 28.5 35.5 8.2 90 534 50 c p 3/25/29 28.6 35.8 5.5 8.2 90 535 0 oc p 3/25/29 28.5 35.5 8.2 90 536 50 oc p 3/25/29 28.5 35.5 8.2  | 22 40<br>29 20)<br>29 20<br>29 17<br>29 17<br>28 17          |
| 86       515       0       c       n       3/8/29       (28.3)       36.2       8.2         86       516       0       c       n       3/9/29       28.3       36.2       8.2         86       517       50       c       n       3/9/29       27.4       36.2       8.2         86       519       50       r       p       3/9/29       27.4       36.2       8.2         87       521       0       oc       n       3/11/29       27.8       36.1       8.2         87       522       50       c       n       3/11/29       26.5       36.1       8.2         87       523       0       oc       p       3/11/29       27.8       36.1       8.2         87       524       50       oc       p       3/11/29       26.5       36.1       8.2         87       525       100       r       p       3/11/29       28.5       35.9       8.2         88       526       0       oc       n       3/23/29       28.6       35.8       8.2         89       528       0       oc       n       3/23/29       28.6<   | 9 20<br>9 17<br>9 17<br>8 17                                 |
| 86       517       50       c       n       3/ 9/29       27.4       36.2       8.2         86       519       50       r       p       3/ 9/29       27.4       36.2       8.2         87       521       0       oc       n       3/11/29       27.8       36.1       8.2         87       522       50       c       n       3/11/29       27.8       36.1       8.2         87       523       0       oc       p       3/11/29       27.8       36.1       8.2         87       524       50       oc       p       3/11/29       27.8       36.1       8.2         87       524       50       oc       p       3/11/29       27.8       36.1       8.2         87       525       100       r       p       3/11/29       23.9       36.0       8.2         88       526       0       oc       n       3/21/29       28.5       35.9       8.2         89       528       0       oc       n       3/23/29       28.4       35.6       8.2         89       529       50       c       n       3/23/29  | 9 17<br>9 17<br>8 17   |
| 86       519       50       r       p       3/9/29       27.4       36.2       8.2         87       521       0       oc       n       3/11/29       27.8       36.1       8.2         87       522       50       c       n       3/11/29       26.5       36.1       8.2         87       523       0       oc       p       3/11/29       27.8       36.1       8.2         87       524       50       oc       p       3/11/29       23.9       36.0       8.2         87       525       100       r       p       3/11/29       23.9       36.0       8.2         88       526       0       oc       n       3/21/29       28.5       35.9       8.2         89       528       0       oc       n       3/23/29       28.4       35.6       8.2         89       529       50       c       n       3/23/29       28.6       35.8       8.2         89       530       0       r       p       3/23/29       28.4       35.6       8.2         89       532       0       oc       n       3/23/29       28.   | 9 17   |
| 87     521     0     oc     n     3/11/29     27.8     36.1     8.2       87     522     50     c     n     3/11/29     26.5     36.1     8.2       87     523     0     oc     p     3/11/29     27.8     36.1     8.2       87     524     50     oc     p     3/11/29     26.5     36.1     8.2       87     525     100     r     p     3/11/29     23.9     36.0     8.2       88     526     0     oc     n     3/21/29     28.5     35.9     8.2       89     528     0     oc     n     3/23/29     28.4     35.6     8.2       89     529     50     c     n     3/23/29     28.6     35.8     8.2       89     530     0     r     p     3/23/29     28.4     35.6     8.2       89     532     0     oc     n     3/23/29     28.4     35.6     8.2       90     533     0     c     n     3/25/29     28.5     35.5     8.2       90     534     50     c     n     3/25/29     28.6     35.6     8.2       90     <  | 8 17   |
| 87 522 50 c n 3/11/29 26.5 36.1 8.2 87 523 0 oc p 3/11/29 27.8 36.1 8.2 87 524 50 oc p 3/11/29 26.5 36.1 8.2 87 524 50 oc p 3/11/29 26.5 36.1 8.2 88 525 100 r p 3/11/29 23.9 36.0 8.2 88 526 0 oc n 3/21/29 28.5 35.9 8.2 89 528 0 oc n 3/23/29 28.6 35.6 8.2 89 529 50 c n 3/23/29 28.6 35.8 8.2 89 530 0 r p 3/23/29 28.6 35.8 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 90 533 0 c n 3/25/29 28.5 35.5 8.2 90 534 50 c n 3/25/29 28.6 35.6 8.2 90 535 0 oc p 3/25/29 28.6 35.6 8.2 90 535 0 oc p 3/25/29 28.6 35.6 8.2 90 536 50 oc p 3/25/29 28.6 35.6 8.2   | 6 00   |
| 87     523     0     oc     p     3/11/29     27.8     36.1     8.2       87     524     50     oc     p     3/11/29     26.5     36.1     8.2       87     525     100     r     p     3/11/29     23.9     36.0     8.2       88     526     0     oc     n     3/21/29     28.5     35.9     8.2       89     528     0     oc     n     3/23/29     28.4     35.6     8.2       89     529     50     c     n     3/23/29     28.4     35.6     8.2       89     530     0     r     p     3/23/29     28.4     35.6     8.2       89     532     0     oc     n     3/23/29     28.4     35.6     8.2       90     533     0     c     n     3/25/29     28.5     35.5     8.2       90     534     50     c     n     3/25/29     28.6     35.6     8.2       90     535     0     oc     p     3/25/29     28.5     35.5     8.2       90     536     50     oc     p     3/25/29     28.6     35.6     8.2       90   | 6 20   |
| 87     525     100     r     p     3/11/29     23.9     36.0     8.2       88     526     0     oc     n     3/21/29     28.5     35.9     8.2       89     528     0     oc     n     3/23/29     28.4     35.6     8.2       89     529     50     c     n     3/23/29     28.6     35.8     8.2       89     530     0     r     p     3/23/29     28.4     35.6     8.2       89     532     0     oc     n     3/23/29     (28.4     35.6     8.2       90     533     0     c     n     3/25/29     28.5     35.5     8.2       90     534     50     c     n     3/25/29     28.6     35.6     8.2       90     535     0     oc     p     3/25/29     28.5     35.5     8.2       90     536     50     oc     p     3/25/29     28.6     35.6     8.2  | 8 17   |
| 88 526 0 oc n 3/21/29 28.5 35.9 8.2 89 528 0 oc n 3/23/29 28.4 35.6 8.2 89 529 50 c n 3/23/29 28.6 35.8 8.2 89 530 0 r p 3/23/29 28.4 35.6 8.2 89 532 0 oc n 3/23/29 28.4 35.6 8.2 90 533 0 c n 3/25/29 28.5 35.5 8.2 90 534 50 c n 3/25/29 28.6 35.6 8.2 90 535 0 oc p 3/25/29 28.5 35.5 8.2 90 536 50 oc p 3/25/29 28.6 35.6 8.2  |  |
| 89     528     0     oc     n     3/23/29     28.4     35.6     8.2       89     529     50     c     n     3/23/29     28.6     35.8     8.2       89     530     0     r     p     3/23/29     28.4     35.6     8.2       89     532     0     oc     n     3/23/29     (28.4     35.6     8.2       90     533     0     c     n     3/25/29     28.5     35.5     8.2       90     534     50     c     n     3/25/29     28.6     35.6     8.2       90     535     0     oc     p     3/25/29     28.5     35.5     8.2       90     536     50     oc     p     3/25/29     28.6     35.6     8.2   |  |
| 89     529     50     c     n     3/23/29     28.6     35.8     8.2       89     530     0     r     p     3/23/29     28.4     35.6     8.2       89     532     0     oc     n     3/23/29     (28.4     35.6     8.2       90     533     0     c     n     3/25/29     28.5     35.5     8.2       90     534     50     c     n     3/25/29     28.6     35.6     8.2       90     535     0     oc     p     3/25/29     28.5     35.5     8.2       90     536     50     oc     p     3/25/29     28.6     35.6     8.2   |  |
| 89     530     0     r     p     3/23/29     28.4     35.6     8.2       89     532     0     oc     n     3/23/29     (28.4     35.6     8.2       90     533     0     c     n     3/25/29     28.5     35.5     8.2       90     534     50     c     n     3/25/29     28.6     35.6     8.2       90     535     0     oc     p     3/25/29     28.5     35.5     8.2       90     536     50     oc     p     3/25/29     28.6     35.6     8.2   | 7 12   |
| 90 533 0 c n 3/25/29 28.5 35.5 8.2<br>90 534 50 c n 3/25/29 28.6 35.6 8.2<br>90 535 0 oc p 3/25/29 28.5 35.5 8.2<br>90 536 50 oc p 3/25/29 28.6 35.6 8.2  | 5 21   |
| 90 534 50 c n 3/25/29 28.6 35.6 8.2<br>90 535 0 oc p 3/25/29 28.5 35.5 8.2<br>90 536 50 oc p 3/25/29 28.6 35.6 8.2  |  |
| 90 535 0 oc p 3/25/29 28.5 35.5 8.2<br>90 536 50 oc p 3/25/29 28.6 35.6 8.2   | 7 21   |
| 90 536 50 oc p 3/25/29 28.6 35.6 8.2  |  |
|   |  |
|   |  |
| 91 541 50 c n 3/27/29 28.5 35.2 8.3   | 0 24   |
| 91 542 0 r p 3/27/29 28.7 35.1 8.3  |  |
| 91 543 50 r p 3/27/29 28.5 35.2 8.3   |  |
| 92 545 0 c n 3/29/29 28.5 35.3 8.2<br>92 546 50 c n 3/29/29 28.4 35.4 8.2   |  |
| 92 548 50 r p 3/29/29 28.4 35.4 8.2   | 9 28   |
| 92 549 100 r p 3/29/29 26.2 36.0 8.2  | 8 28   |
| 93 550 0 c n 3/31/29 28.7 34.7 8.3  | 0 28   |
| 93 551 50 c n 3/31/29 28.5 34.8 8.3   | 0 28   |
| 93 552 0 r p 3/31/29 28.7 34.7 8.3  |  |
| 93 553 100 oc p 3/31/29 27.6 35.8 8.2<br>94 557 0 r n 4/22/29 29.5 34.7 8.2   |  |
| 94 558 50 oc n 4/22/29 29.3 34.7 8.2  |  |
| 94 559 100 c n 4/22/29 28.5 35.6 8.2  | 1 25   |
| 94 561 50 r p 4/22/29 29.3 34.7 8.2   | 5 14   |
| 95 563 50 c n 4/24/29 29.3 34.9 8.2   |  |
| 95 564 100 c n 4/24/29 28.5 35.4 8.2 95 565 0 r p 4/24/29 29.4 34.7 8.2   |  |
| 95 565 0 r p 4/24/29 29.4 34.7 8.2<br>95 566 50 r p 4/24/29 29.3 34.9 8.2   |  |
| 95 568A 0 r n 4/25/29 (29.4 34.7 8.2  | 6 14)  |
| 96 568 0 c n 4/26/29 29.3 35.3 8.2  | 3 12   |
| 96 569 50 c n 4/26/29 29.2 35.3 8.2   |  |
| 96 570 100 oc n 4/26/29 28.2 35.7 8.1 96 571 0 oc p 4/26/29 29.3 35.3 8.2   |  |
| 96 571 0 oc p 4/26/29 29.3 35.3 8.2 96 572 50 oc p 4/26/29 29.2 35.3 8.2  |  |
| 97 574 0 oc n 4/28/29 28.3 35.2 8.1   |  |
| 97 575 50 c n 4/28/29 28.0 35.4 8.1   | 6 21   |
| 97 576 100 c n 4/28/29 27.6 35.6 8.1  |  |
| 97 577 0 oc p 4/28/29 28.3 35.2 8.1   |  |
| 97 578 50 oc p 4/28/29 28.0 35.4 8.1<br>98 581 0 c n 4/30/29 27.0 35.3 8.1  |  |
| 98 581 0 c n 4/30/29 27.0 35.3 8.1 98 582 50 oc n 4/30/29 26.9 35.3 8.1   |  |
| 98 584 0 r p 4/30/29 27.0 35.3 8.1  |  |
| 98 588 0-100 r p 4/30/29 26.7 35.4 8.1  |  |
| 99 589 0 oc n 5/2/29 27.9 34.9 8.2  |  |
| 99 591 100 c n 5/2/29 27.8 35.0 8.2<br>99 593 50 r p 5/2/29 27.8 34.9 8.2   |  |
| 99 593 50 r p 5/2/29 27.8 34.9 8.2<br>99 595 0 c n 5/2/29 27.9 34.9 8.2   |  |
| 100 596 50 c n 5/4/29 27.6 34.7 8.2   | 1 10   |
| 100 597 100 c n 5/4/29 27.6 34.7 8.2  | 2 12   |
| 100 598 0 oc p 5/4/29 27.7 34.7 8.2   | 10   |
| 101 603 0 c n 5/7/29 26.3 34.7 8.2 101 604 50 c n 5/7/29 26.2 34.7 8.2  | 4 8  |
| 101 604 50 c n 5/7/29 26.2 34.7 8.2<br>101 605 100 c n 5/7/29 25.2 35.1 8.2   | 3 8  |
| 101 606 0 r p 5/ 7/29 26.3 34.7 8.2   | 4 8  |
| 101 607 50 r p 5/7/29 26.2 34.7 8.2   | 4 8  |
| 102 609 0 c n 5/9/29 25.8 35.0 8.2  | 4 8  |
| 102 610 50 c n 5/9/29 25.8 35.0 8.2   | 1 8  |
| 102 611 100 oc n 5/9/29 25.6 35.0 8.2 102 612 0 oc p 5/9/29 25.8 35.0 8.2   | 4 9  |
| 10H 01H 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 4 8  |
| 102 613 50 oc p 5/9/29 25.8 35.0 8.2 103 615 0 c n 5/11/29 26.0 35.0 8.2  |  |
| 103 616 50 c n 5/11/29 25.8 35.2 8.2  | 5 5  |
| 103 617 100 c n 5/11/29 24.8 35.2 8.2   | 5 5  |
| 103 618 0 r p 5/11/29 26.0 35.0 8.2   | 5 5  |

Table 46. Distributional and environmental records for Ceratium contrarium -- Continued

| Station    | Sample     | Depth (m)       | Relative abundance | Appa-  | Date               | Temperature (°C) | Salinity<br>(0/00) | рН           | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|------------|-----------------|--------------------|--------|--------------------|------------------|--------------------|--------------|--------------------------------------|
| 103        | 619        | 50              | r                  |        | 5/11/29            | 25.8             | 35.2               | 8.25         |                                      |
| 104        | 621        | 0               | c                  | p<br>n | 5/13/29            | 26.1             | 35.2               | 8.24         | 5<br>7<br>7                          |
| 104        | 622        | 50              | С                  | n      | 5/13/29            | 25.8             | 35.2               | 8.24         | 7                                    |
| 104        | 623        | 100             | c                  | n      | 5/13/29            | 25.3             | 35.3               | 8.21         | 7                                    |
| 104        | 624        | 0               | r                  | p      | 5/13/29            | 26.1             | 35.2               | 8.24         | 7                                    |
| 104        | 625        | 50              | OC.                | p      | 5/13/29            | 25.8             | 35.2               | 8.24         | 75555555554                          |
| 105<br>105 | 627<br>630 | 50<br>0         | c                  | n      | 5/15/29            | 26.8             | 34.9               | 8.23         | 5                                    |
| 105        | 631        | 50              | oc                 | p      | 5/15/29<br>5/15/29 | 26.9<br>26.8     | 34.9<br>34.9       | 8.23<br>8.23 | 5                                    |
| 106        | 633        | 0               | c                  | p<br>n | 5/17/29            | 27.2             | 35.0               | 8.23         | 5                                    |
| 106        | 634        | 50              | c                  | n      | 5/17/29            | 27.0             | 35.0               | 8.23         | 5                                    |
| 106        | 635        | 100             | С                  | n      | 5/17/29            | 25.6             | 35.1               | 8.23         | 5                                    |
| 106        | 637        | 50              | r                  | p      | 5/17/29            | 27.0             | 35.0               | 8.23         | 5                                    |
| 106        | 638        | 100             | r                  | p      | 5/17/29            | 25.6             | 35.1               | 8.23         | 5                                    |
| 107<br>107 | 639<br>640 | 0<br><b>5</b> 0 | c                  | n      | 5/19/29            | 28.0             | 34.4               | 8.23<br>8.23 | 5                                    |
| 107        | 641        | 100             | c<br>c             | n<br>n | 5/19/29<br>5/19/29 | 27.9<br>26.8     | 34.4<br>34.9       | 8.23         | 11                                   |
| 107        | 642        | 0               | oc                 | p      | 5/19/29            | 28.0             | 34.4               | 8.23         | 5                                    |
| 107        | 643        | 50              | oc                 | p      | 5/19/29            | 27.9             | 34.4               | 8.23         | 5<br>4                               |
| 107        | 644        | -100            | oc                 | p      | 5/19/29            | 26.8             | 34.9               | 8.23         | 11                                   |
| 107        | 645        | 50              | oc                 | p      | 5/19/29            | 27.9             | 34.4               | 8.23         | 4                                    |
| 108        | 646        | 0               | С                  | n      | 5/27/29            | 28.4             | 35.0               | 8.25         | 4                                    |
| 108        | 647        | 50              | c                  | n      | 5/27/29            | 26.8             | 35.0               | 8.24         | 4<br>4<br>4                          |
| 108        | 648        | 100             | c                  | n      | 5/27/29            | 25.2             | 35.0               | 8.23         | 4                                    |
| 108<br>108 | 649<br>651 | 0<br>100        | r                  | p      | 5/27/29<br>5/27/29 | 28.4<br>25.2     | 35.0<br>35.0       | 8.25<br>8.23 | 4                                    |
| Guam       | 652        | 0               | oc                 | p<br>n | 5/ /29             | 23.2             | 33.0               | 0.20         |                                      |
| 109        | 654        | ŏ               | oc                 | n      | 5/29/29            | 27.4             | 35.0               | 8.23         | 33537577                             |
| 109        | 655        | 50              | c                  | n      | 5/29/29            | 23.1             | 35.0               | 8.22         | 3                                    |
| 109        | 656        | 100             | С                  | n      | 5/29/29            | 19.4             | 34.8               | 8.18         | 5                                    |
| 109        | 658        | 50              | oc                 | p      | 5/29/29            | 23.1             | <b>35</b> .0       | 8.22         | 3                                    |
| 110        | 662        | 50              | oc                 | n      | 5/31/29            | 18.4             | 34.8               | 8.16         | 7                                    |
| 111        | 668        | 0               | oc                 | n      | 6/ 3/29            | 20.1             | 34.5               | 8.18         | 5                                    |
| 112        | 674        | 0<br>50         | c                  | n      | 6/ 5/29<br>6/ 5/29 | 23.2<br>21.7     | 34.6<br>34.6       | 8.22<br>8.23 | 7                                    |
| 112<br>112 | 675<br>676 | 100             | c<br>oc            | n<br>n | 6/ 5/29            | 19.8             | 34.7               | 8.20         | 8                                    |
| 112        | 677        | 0               | r                  | p      | 6/ 5/29            | 23.2             | 34.6               | 8.22         | 7                                    |
| 112        | 678        | 50              | r                  | p      | 6/ 5/29            | 21.7             | 34.6               | 8.23         | 7<br>7<br>5<br>5                     |
| 113        | 680        | 0               | r                  | n      | 6/25/29            | 24.2             | 34.5               | 8.25         | 5                                    |
| 113        | 681        | 50              | C                  | n      | 6/25/29            | 23.8             | 34.6               | 8.25         | 5                                    |
| 113        | 682        | 100             | oc                 | n      | 6/25/29            | 21.5             | 34.7               | 8.23         | 8                                    |
| 113        | 684        | 50              | oc                 | p      | 6/25/29            | 23.8             | 34.6               | 8.25         | 5<br>8                               |
| 113<br>114 | 685<br>687 | 100<br>50       | oc                 | p      | 6/25/29<br>6/27/29 | 21.5<br>16.2     | 34.7<br>34.6       | 8.23<br>8.04 | 63                                   |
| 128        | 773        | 0               | r                  | n<br>n | 7/25/29            | 16.4             | 33.0               | 8.12         | 29                                   |
| 128        | 774        | 50              | r                  | n,     | 7/25/29            | 11.8             | 33.1               | 8.11         | 29                                   |
| 128        | 775        | 100             | r                  | n      | 7/25/29            | 10.2             | 33.2               | 8.06         | 46                                   |
| 128        | 776        | 0               | r                  | p      | 7/25/29            | 16.4             | 33.0               | 8.12         | 29                                   |
| 128        | 779        | 0               | С                  | n      | 7/25/29            | 16.4             | 33.0               | 8.12         | 29                                   |
| 129        | 780        | 0               | С                  | n      | 7/27/29            | 16.3             | 33.1               | 8.13         | 25                                   |
| 130        | 781        | 0               | oc                 | n      | 9/ 4/29            | 16.2             | 33.4               | 8.34         | 36<br>36                             |
| 130<br>131 | 787<br>788 | 0               | c                  | n      | 9/ 4/29 9/ 6/29    | 16.2<br>19.3     | 33.4<br>33.4       | 8.34<br>8.34 | 30                                   |
| 131        | 789        | 100             | oc<br>oc           | n<br>n | 9/ 6/29            | 12.1             | 33.4               | 8.32         | • • •                                |
| 131        | 792        | 0               | oc                 | p      | 9/6/29             | 19.3             | 33.4               | 8.34         | •••                                  |
| 131        | 793        | 0               | r                  | p      | 9/6/29             | 19.3             | 33.4               | 8.34         | ***                                  |
| 131        | 794        | 0               | r                  | p      | 9/ 6/29            | 19.3             | 33.4               | 8.34         |                                      |
| 132        | 797        | 0               | c                  | n      | 9/ 8/29            | 21.0             | 33.9               | 8.34         | 15                                   |
| 132        | 798        | 50              | oc                 | n      | 9/ 8/29            | 17.6             | 33.9               | 8.33         | 19                                   |
| 132        | 799        | 100             | oc                 | n      | 9/ 8/29<br>9/ 8/29 | 14.3<br>21.0     | 33.4<br>33.9       | 8.30<br>8.34 | 16<br>15                             |
| 132<br>132 | 801<br>802 | 50              | oc<br>r            | p      | 9/ 8/29            | 17.6             | 33.9               | 8.33         | 19                                   |
| 133        | 804        | 0               | oc                 | p<br>n | 9/10/29            | 22.7             | 34.7               | 8.47         | 7                                    |
| 133        | 805        | 50              | oc                 | n      | 9/10/29            | 20.8             | 34.7               | 8.37         | 7                                    |
| 133        | 806        | 100             | r                  | n      | 9/10/29            | 18.4             | 34.8               | 8.31         | 7                                    |
| 133        | 812        | 0               | r                  | p      | 9/10/29            | 22.7             | 34.7               | 8.47         | 7                                    |
| 133        | 814        | 100             | oc                 | n      | 9/10/29            | 18.4             | 34.8               | 8.31         | 7                                    |
| 134        | 808        | 0               | oc                 | n      | 9/12/29            | 22.9             | 34.7               | 8.34         | 6                                    |
| 134        | 809        | 50              | oc                 | n      | 9/12/29            | 19.8             | 34.6               | 8.34<br>8.34 | 6                                    |
| 134        | 810        | 100             | oc                 | n      | 9/12/29<br>9/12/29 | 18.1<br>22.9     | 34.6<br>34.7       | 8.34         | 6                                    |
| 134<br>134 | 815<br>817 | 0<br>100        | r                  | p      | 9/12/29            | 18.1             | 34.6               | 8.34         | 6                                    |
| 134        | 820        | 0               | C                  | p<br>n | 9/14/29            | 23.8             | 35.1               | 8.37         | 6<br>6<br>7<br>5                     |
| 135        | 821        | 50              | oc                 | n      | 9/14/29            | 21.5             | 35.0               | 8.37         | 5                                    |
|            | 822        | 100             | c                  | n      | 9/14/29            | 18.7             | 34.8               | 8.34<br>8.37 | 5 7                                  |
| 135        |            |                 |                    |        |                    | 23.8             | 35.1               |              |                                      |

Table 46. Distributional and environmental records for Ceratium contrarium -- Continued

|                   |            | Depth     | Relative  | Appa-  | T                    | Temperature  | Salinity     |              | PO <sub>4</sub>               |
|-------------------|------------|-----------|-----------|--------|----------------------|--------------|--------------|--------------|-------------------------------|
| Station           | Sample     | (m)       | abundance | ratus  | Date                 | (°C)         | (0/00)       | pН           | mg/m <sup>3</sup>             |
| 135               | 825        | 150       | r         | n      | 9/14/29              | 21.5         | 35.0         | 8.37         | 5                             |
| 136               | 827        | 0         | oc        | n      | 9/16/29              | 24.6         | 35.4         | 8.37         | 3                             |
| 136               | 828        | 50        | С         | n      | 9/16/29              | 21.4         | 35.1         | 8.39         | 3                             |
| 136               | 829        | 100       | c         | n      | 9/16/29              | 18.6         | 35.0         | 8.39         | 3                             |
| 136               | 832<br>833 | 0<br>50   | r         | p      | 9/16/29              | 24.6         | 35.4         | 8.37         | 3                             |
| 136<br>137        | 836        | 0         | r<br>c    | p      | 9/16/29<br>9/18/29   | 18.6<br>25.5 | 35.0<br>35.0 | 8.39<br>8.39 | 3                             |
| 137               | 837        | 50        | c         | n<br>n | 9/18/29              | 24.4         | 35.1         | 8.34         | A                             |
| 137               | 838        | 100       | c         | 'n     | 9/18/29              | 21.5         | 35.1         | 8.30         | 3<br>3<br>3<br>4<br>4<br>5    |
| 137               | 840        | 50        | г         | p      | 9/18/29              | 24.4         | 35.1         | 8.34         | 4                             |
| 137               | 841        | 50        | r         | p      | 9/18/29              | 24.4         | 35.1         | 8.34         | 4                             |
| 137               | 842        | 100       | r         | p      | 9/18/29              | 21.5         | 35.1         | 8.30         | 5                             |
| 138               | 843        | 0         | С         | n      | 9/20/29              | 26.1         | 34.8         | 8.35         | 5                             |
| 138<br>138        | 844<br>845 | 50<br>100 | c         | n      | 9/20/29              | 25.6         | 34.7         | 8.30         | 3                             |
| 138               | 847        | 0         | C<br>T    | . n    | 9/20/29<br>9/20/29   | 22.2<br>25.6 | 34.8<br>34.7 | 8.31<br>8.30 | 3                             |
| 138               | 848        | 50        | r         | p<br>p | 9/20/29              | 25.6         | 34.7         | 8.30         | 3                             |
| 139               | 849        | 0         | oc        | n      | 9/22/29              | 26.7         | 34.8         | 8.34         | 6                             |
| 139               | 850        | 50        | c         | n      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6                             |
| 139               | 854        | 50        | r         | p      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6                             |
| 140               | 856        | 0         | С         | n      | 10/ 3/29             | 26.9         | 35.0         | 8.42         | 7                             |
| 140               | 857        | 50        | С         | n      | 10/ 3/29             | 26.9         | 35.0         | 8.39         | 7                             |
| 140               | 858        | 100       | c         | n      | 10/ 3/29             | 25.5         | 35.0         | 8.34         | 7                             |
| 140<br>140        | 860<br>862 | 0<br>100  | r         | p      | 10/ 3/29<br>10/ 3/29 | 26.9<br>25.5 | 35.0<br>35.0 | 8.42<br>8.34 | 7                             |
| 140               | 863        | 100       | r         | p<br>p | 10/ 3/29             | 25.5         | 35.0         | 8.34         | 17                            |
| 141               | 864        | 0         | c         | n      | 10/ 5/29             | 25.9         | 35.2         | 8.34         | 5                             |
| 141               | 865        | 50        | c         | n      | 10/ 5/29             | 24.8         | 35.3         | 8.34         | 5                             |
| 141               | 869        | 50        | r         | p      | 10/ 5/29             | 24.8         | 35.3         | 8.34         | 45533336667777775555555575666 |
| 141               | 870        | 50        | oc        | p      | 10/ 5/29             | 24.8         | 35.3         | 8.34         | 5                             |
| 141               | 871        | 100       | r         | p      | 10/ 5/29             | 20.0         | 35.0         | 8.33         | 5                             |
| 143               | 872        | 0<br>50   | C         | n      | 10/ 7/29             | 24.1         | 34.8         | 8.33         | 5                             |
| 142<br>142        | 873<br>874 | 100       | c<br>c    | n<br>n | 10/ 7/29<br>10/ 7/29 | 21.8<br>16.6 | 34.8<br>34.4 | 8.30<br>8.27 | อ<br>7                        |
| 142               | 876        | 0         | oc        | p      | 10/ 7/29             | 24.1         | 34.8         | 8.33         | 5                             |
| 143               | 881        | ŏ         | c         | n      | 10/ 9/29             | 22.4         | 34.4         | 8.30         | 6                             |
| 143               | 882        | 50        | oc        | n      | 10/ 9/29             | 19.0         | 34.2         | 8.34         | 6                             |
| 143               | 883        | 100       | С         | n      | 10/ 9/29             | 22.4         | 34.4         | 8.30         | 6                             |
| 143               | 884        | 0         | r         | p      | 10/ 9/29             | 22.4         | 34.4         | 8.30         | 6<br>6<br>6<br>6<br>6         |
| 143               | 885        | 50        | r         |        | 10/ 9/29             | 19.0         | 34.2         | 8.34         | 6                             |
| 144               | 886        | 0         | C         |        | 10/11/29             | 23.3         | 35.0         | 8.37         | 6                             |
| 144<br>144        | 887<br>888 | 0<br>50   | r         |        | 10/11/29             | 23.3<br>21.1 | 35.0<br>34.7 | 8.37<br>8.33 | 6                             |
| 145               | 890        | 0         | c         |        | 10/11/29<br>10/13/29 | 22.3         | 34.6         | 8.29         | 6                             |
| 145               | 891        | 50        | c         |        | 10/13/29             | 18.7         | 34.3         | 8.34         | 6                             |
| 145               | 892        | 100       | c         |        | 10/13/29             | 16.0         | 34.1         | 8.31         | 6                             |
| 145               | 893        | 0         | oc        |        | 10/13/29             | 22.3         | 34.6         | 8.29         | 6                             |
| 145               | 894        | 50        | oc        |        | 10/13/29             | 18.7         | 34.3         | 8.34         | 6<br>6<br>6                   |
| 145               | 895        | 100       | r         |        | 10/13/29             | 16.0         | 34.1         | 8.31         | 6                             |
| 146<br>146        | 896<br>897 | 0<br>50   | C         |        | 10/15/29             | 22.4         | 34.9         | 8.37         | 0                             |
| 146               | 898        | 100       | oc<br>c   |        | 10/15/29<br>10/15/29 | 22.4<br>19.7 | 34.9<br>34.3 | 8.30<br>8.26 | 7                             |
| 146               | 900        | 0         | r         |        | 10/15/29             | 22.4         | 34.9         | 8.37         | 6                             |
| 146               | 901        | 50        | r         | p      | 10/15/29             | 22.4         | 34.9         | 8.30         | 6                             |
| 146               | 902        | 100       | r         | p      | 10/15/29             | 19.7         | 34.3         | 8.26         | 7 8                           |
| 147               | 903        | 0         | oc        | n      | 10/15/29             | 23.3         | 35.3         | 8.26         | 8                             |
| 147               | 904        | 50        | oc        |        | 10/17/29             | 23.1         | 35.3         | 8.29         | 5                             |
| 147               | 905        | 100       | oc        |        | 10/17/29             | 19.2         | 35.0         | 8.29<br>8.26 | 5                             |
| 147<br>147        | 907<br>908 | 0<br>50   | oc<br>oc  |        | 10/17/29<br>10/17/29 | 23.3<br>23.1 | 35.3<br>35.3 | 8.29         | 8<br><b>5</b>                 |
| 147               | 909        | 100       | r         |        | 10/17/29             | 19.2         | 35.0         | 8.29         | 5                             |
| 148               | 910        | 0         | oc        |        | 10/19/29             | 23.4         | 35.2         |              |                               |
| 148               | 911        | 50        | oc        |        | 10/19/29             | 23.0         | 35.1         |              |                               |
| 148               | 912        | 100       | oc '      | n      | 10/19/29             | 20.0         | 35.0         | ****         | • • •                         |
| 149               | 920        | 0         | С         | n      | 10/19/29             | 20.0         | 35.0         |              |                               |
| 149               | 921        | 50        | c         |        | 10/21/29             | 23.3         | 35.0         | 8.37         | 6                             |
| 149               | 922        | 100       | С         |        | 10/21/29             | 20.3         | 34.9         | 8.38         | 6                             |
| 149<br>150        | 927<br>929 | 0         | r         |        | 10/21/29             | 23.5<br>25.6 | 35.0<br>34.7 | 8.34<br>8.39 | 6<br>7                        |
| 150               | 929        | 50        | c<br>r    |        | 10/23/29<br>10/23/29 | 22.8         | 34.7         | 8.35         | 10                            |
| 150               | 931        | 100       | oc        |        | 10/23/29             | 19.6         | 34.6         | 8.32         | 11                            |
| 150               | 933        | 0         | r         |        | 10/23/29             | 25.6         | 34.7         | 8.39         | 7                             |
| 150               | 934        | 50        | r         |        | 10/23/29             | 22.8         | 34.8         | 8.35         | 10                            |
|                   | 935        | 100       | r         |        | 10/23/29             | 19.6         | 34.6         | 8.32         | 11                            |
| 150               |            |           |           |        |                      |              |              |              |                               |
| 150<br>151<br>151 | 937<br>938 | 0<br>50   | oc<br>oc  | n      | 10/26/29<br>10/26/29 | 26.0<br>18.3 | 34.0<br>34.4 | *****        | ***                           |

Table 46. Distributional and environmental records for Ceratium contrarium--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|---------|--------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------------------|
| 151     | 939    | 100       | С                  | n              | 10/26/29 | 12.5                | 34.6               |      |                                      |
| 151     | 941    | 0         | r                  | p              | 10/26/29 | 26.0                | 34.0               |      | ***                                  |
| 151     | 942    | 50        | r                  | p              | 10/26/29 | 18.3                | 34.4               |      | •••                                  |
| 152     | 944    | 0         | r                  | n              | 10/27/29 | 27.4                | 33.7               | 8.35 | 20                                   |
| 152     | 946    | 100       | r                  | n              | 10/27/29 | 11.4                | 34.7               | 7.76 | 75                                   |
| 152     | 948    | 0         | r                  | p              | 10/27/29 | 27.4                | 33.7               | 8.35 | 20                                   |
| 153     | 951    | 0         | r                  | 'n             | 10/29/29 | 28.1                | 34.2               | 8.47 | 7                                    |
| 153     | 952    | 50        | oc                 | n              | 10/29/29 | 28.1                | 34.4               | 8.39 | 7                                    |
| 153     | 953    | 100       | r                  | n              | 10/29/29 | 20.5                | 34.7               | 8.28 | 31                                   |
| 153     | 956    | 50        | r                  | p              | 10/29/29 | 28.1                | 34.4               | 8.39 | 7                                    |
| 155     | 965    | 0         | r                  | n              | 11/ 2/29 | 27.8                | 34.9               | 8.29 | 29                                   |
| 157     | 978    | 0         | oc                 | n              | 11/ 6/29 | 27.1                | 35.3               | 8.27 | 47                                   |
| 158     | 983    | 0         | С                  | n              | 11/ 8/29 | 28.2                | 35.6               | 8.34 | 36                                   |
| 158     | 984    | 50        | c                  | n              | 11/ 8/29 | 28.2                | 35.6               | 8.39 | 50                                   |
| 158     | 985    | 100       | С                  | n              | 11/ 8/29 | 27.6                | 35.9               | 8.39 | 48                                   |
| 159     | 990    | 0         | c                  | n              | 11/11/29 | 28.6                | 35.7               | 8.37 | 15                                   |
| 159     | 991    | 50        | c                  | n              | 11/11/29 | 28.5                | 35.7               | 8.39 | 15                                   |
| 159     | 992    | 100       | oc                 | n              | 11/11/29 | 28.0                | 35.7               | 8.37 | 23                                   |
| 160     | 1000   | 0         | oc                 | n              | 11/13/29 | 28.6                | 35.6               | 8.37 | 12                                   |
| 160     | 1002   | 50        | С                  | n              | 11/13/29 | 28.6                | 35.6               | 8.39 | 15                                   |
| 160     | 1003   | 100       | oc                 | n              | 11/13/29 | 28.5                | 35.7               | 8.44 | 16                                   |

Table 47. Distributional and environmental records for Ceratium trichoceros

| Station  | Sample       | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(0/00) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup>  |
|----------|--------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|---------------------------------------|
| 1        | 1            | 0         | С                  | n              | 5/12/28              | 24.0                | 36.2               | 8.16         | 34                                    |
| 1b       | 6            | 0         | c                  | n              | 5/16/28              | (22.3               | 36.3               | 8.20         | 46)                                   |
| 1b       | 7            | 50        | oc                 | n              | 5/16/28              | (22.2               | 36.4               | 8.21         | 39)                                   |
| 1b       | 8            | 100       | С                  | n              | 5/16/28              | (20.3               | 35.5               | 8.18         |                                       |
| 2        | 13           | 100       | oc                 | n              | 5/18/28              | 19.8                | 36.4               | 8.21         | 33                                    |
| 2        | 14           | 0         | ос                 | n              | 5/18/28              | 20.5                | 36.4               | 8.23         | 58                                    |
| 13a      | 88<br>89     | 0         | r                  | n              | 8/ 8/28<br>8/ 8/28   | (21.2<br>(21.2      | 35.2<br>35.2       | 8.18<br>8.18 | 11)<br>11)                            |
| 13a      | 90           | 0         | r                  | n              | 8/ 8/28<br>8/ 9/28   | 21.2                | 35.2               | 8.18         | 11                                    |
| 14<br>14 | 93           | 0         | r<br>oc            | n              | 8/ 9/28              | 21.2                | 35.2               | 8.18         | 11                                    |
| 14       | 94           | 100       | r                  | p<br>n         | 8/ 9/28              | 14.0                | 35.6               | 8.06         | 34                                    |
| 16       | 103          | 0         | r                  |                | 8/13/28              | 25.9                | 36.2               | 8.24         | 8                                     |
| 16       | 103          | 50        | oc                 | p              | 8/13/28              | 24.4                | 36.4               | 8.23         | 8                                     |
| 16       | 104          | 0         | r                  | p<br>n         | 8/13/28              | 25.9                | 36.2               | 8.24         | 8<br>8<br>8                           |
| 16       | 107          | 50        | oc                 | n              | 8/13/28              | 24.4                | 36.4               | 8.23         | 8                                     |
| 17       | 112          | 50        | oc                 | n              | 8/15/28              | 21.9                | 36.6               | 8.28         | 12                                    |
| 18       | 115          | 50        | r                  | p              | 8/17/28              | 22.4                | 36.8               | 8.24         | 5                                     |
| 18       | 116          | 100       | ос                 | p              | 8/17/28              | 20.4                | 36.8               | 8.21         | 5                                     |
| 18       | 119          | 100       | r                  | 'n             | 8/17/28              | 20.4                | 36.8               | 8.21         | 5                                     |
| 19       | 123          | 50        | ос                 | n              | 8/20/28              | 25.2                | 37.1               | 8.27         | 5                                     |
| 19       | 124          | 100       | c                  | n              | 8/20/28              | 22.4                | 37.0               | 8.25         | 12<br>5<br>5<br>5<br>5<br>5<br>3      |
| 20       | 126          | 50        | r                  | р              | 8/22/28              | 25.8                | 36.6               | 8.26         | 3                                     |
| 20       | 129          | 50        | r                  | n              | 8/22/28              | 25.8                | 36.6               | 8.26         | 3<br>8<br>2<br>2<br>2<br>2<br>30<br>4 |
| 22       | 139          | . 0       | r                  | p              | 8/27/28              | 26.7                | 36.0               | 8.26         | 8                                     |
| 32       | 194          | 0         | r                  | n              | 10/ 5/28             | 28.0                | 36.0               | 8.23         | 2                                     |
| 32       | 194A         | 0         | r                  | p              | 10/ 5/28             | 28.0                | 36.0               | 8.23         | 2                                     |
| 32       | 195          | 50        | oc                 | n              | 10/ 5/28             | 27.2<br>22.2        | 36.0               | 8.24         | 20                                    |
| 32       | 196          | 100       | oc                 | n              | 10/ 5/28             | 28.5                | 36.4<br>35.6       | 8.10<br>8.23 | 30                                    |
| 33       | 197A         | 0         | r                  | p              | 10/ 8/28             | 28.2                | 36.2               | 8.24         | 4                                     |
| 33<br>33 | 198<br>198A  | 50        | oc                 | n              | 10/ 8/28<br>10/ 8/28 | 28.2                | 36.2               | 8.24         | 4                                     |
| 33       | 198A<br>199A | 50<br>100 | r                  | p              | 10/ 8/28             | 22.3                | 36.5               | 8.18         | 23                                    |
| 34       | 200A         | 0         | oc                 | p<br>p         | 10/ 9/28             | 28.5                | 35.9               | 8.28         | 23<br>2<br>3                          |
| 34       | 202          | 50        | oc                 | n              | 10/ 9/28             | 25.0                | 36.5               | 8.21         | 3                                     |
| 37       | 218          | 50        | oc                 | n              | 11/ 1/28             | 18.8                | 34.5               | 8.00         | 121                                   |
| 37       | 219          | 100       | r                  | n              | 11/ 1/28             | 15.1                | 34.9               | 7.82         | 153                                   |
| 37       | 220          | 0         | oc                 | p              | 11/ 1/28             | 27.1                | 31.7               | 8.28         | 15                                    |
| 37       | 221          | 50        | oc                 | p              | 11/ 1/28             | 18.8                | 34.5               | 8.00         | 121                                   |
| 38       | 222          | 0         | r                  | n              | 11/ 3/28             | 26.5                | 32.9               | 8.33         | 20                                    |
| 39       | 226          | 50        | r                  | n              | 11/ 6/28             | 16.3                | 34.6               | 7.92         | 48                                    |
| 40       | 232          | 0         | r                  | p              | 11/ 8/28             | 22.2                | 33.7               | 8.21         | 24                                    |
| 40       | 234          | 100       | r                  | p              | 11/ 8/28             | 13.9                | 35.0               | 7.85         | 159                                   |
| 41       | 236          | 50        | r                  | n              | 11/10/28             | 14.6                | 35.0               | 7.94         | 58                                    |
| 41       | 237          | 100       | r                  | n              | 11/10/28             | 14.5                | 35.0               | 7.91         | 152                                   |
| 41       | 238          | 0         | r                  | p              | 11/10/28             | 20.4                | 34.2               | 8.11         | 32<br>13                              |
| 49       | 282          | 100       | r                  | р              | 11/27/28             | 21.6                | 35.9               | 8.26         | 13                                    |

Table 47. Distributional and environmental records for Ceratium trichoceros--Continued

|             |             |            |                    |                |                      |                     |                    | COME         | ucu                      |
|-------------|-------------|------------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------|
| Station     | Sample      | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m3 |
| 50          | 900         | 100        |                    |                | 11 (00 (00           | 00.5                |                    |              |                          |
| 50          | 286<br>288  | 100<br>50  | oc<br>oc           | n              | 11/29/28<br>11/29/28 | 20.5<br>22.0        | 35.7<br>35.9       | 8.22         | 13                       |
| 52          | 300         | 50         | oc                 | p<br>n         | 12/ 3/28             | 20.2                | 35.6               | 8.23<br>8.20 | 13<br>8                  |
| 52          | 301         | 100        | oc                 | n              | 12/ 3/28             | 18.2                | 35.2               | 8.17         | 8                        |
| 53          | 303         | 0          | r                  | n              | 12/ 5/28             | 22.6                | 35.7               | 8.22         | 13                       |
| 53          | 304         | 50         | oc                 | n              | 12/ 5/28             | 21.2                | 35.8               | 8.20         | 13                       |
| 53<br>53    | 305<br>306  | 100        | oc                 | n              | 12/ 5/28             | 19.9                | 35.6               | 8.19         | 13                       |
| 53-54       | 307         | ő          | r                  | p<br>n         | 12/ 5/28<br>12/ 6/28 | 22.6<br>(23.0       | 35.7<br>35.6       | 8.22<br>8.22 | 13<br>11)                |
| 53-54       | 308         | ŏ          | oc                 | n              | 12/ 6/28             | (23.0               | 35.6               | 8.22         | 11)                      |
| 53-54       | 310         | 0          | oc                 | n              | 12/10/28             | (23.0               | 35.6               | 8.22         | ii                       |
| 53-54       | 311         | 0          | - oc               | n              | 12/10/28             | (23.0               | 35.6               | 8.22         | 11)                      |
| 53-54       | 313         | 0          | r                  | n              | 12/10/28             | (23.0               | 35.6               | 8.22         | 11)                      |
| 53-54<br>56 | 317<br>330  | 100        | r<br>oc            | n<br>n         | 12/12/28<br>12/18/28 | (23.0<br>16.6       | 35.6<br>34.8       | 8.22<br>8.11 | 11)<br>12                |
| 57          | 340         | 100        | r                  | p              | 12/20/28             | 14.3                | 34.4               | 8.10         | 40                       |
| 64          | 396         | 100        | ос                 | 'n             | 1/ 3/29              | 15.8                | 34.5               | 8.10         | 32                       |
| 66          | 414         | 50         | oc                 | p              | 1/ 7/29              | 17.8                | 34.8               | 8.10         | 29                       |
| 66          | 415         | 100        | r                  | р              | 1/ 7/29              | 17.8                | 34.9               | 8.12         | 21                       |
| 67<br>67    | 416<br>418  | 100        | oc<br>r            | n<br>n         | 1/ 8/29<br>1/ 8/29   | 19.3                | 34.9               | 8.11<br>8.05 | 21                       |
| 69          | 425         | 50         | r                  | n              | 1/12/29              | 16.2<br>17.4        | 34.6<br>35.1       | 7.99         | 40<br>151                |
| 75          | 466         | 50         | r                  | p              | 2/14/29              | 20.0                | 35.5               | 8.14         | 46                       |
| 76          | 471         | 50         | r                  | p              | 2/16/29              | 22.1                | 35.9               | 8.14         | 42                       |
| 78          | 476         | 50         | r                  | n              | 2/20/29              | 23.8                | 36.1               | 8.14         | 32                       |
| 78          | 477         | 100        | r                  | n              | 2/20/29              | 21.9                | 36.2               | 8.14         | 34                       |
| 78<br>81    | 479<br>491  | 50<br>0    | r<br>oc            | p<br>n         | 2/20/29<br>2/26/29   | 23.8<br>26.5        | 36.1<br>35.8       | 8.14<br>8.19 | 32<br>38                 |
| 81          | 492         | 50         | oc                 | n              | 2/26/29              | 26.4                | 35.9               | 8.19         | 38                       |
| 81          | 493         | 0          | r                  | p              | 2/26/29              | 26.5                | 35.8               | 8.19         | 38                       |
| 81          | 494         | 50         | r                  | p              | 2/26/29              | 26.4                | 35.9               | 8.19         | <b>3</b> 8               |
| 82          | 497         | 50         | r                  | n              | 2/28/29              | 27.2                | 36.3               | 8.21         | 34                       |
| 82<br>89    | 500<br>531  | 100<br>100 | oc                 | p              | 2/28/29<br>3/23/29   | 24.4<br>26.4        | 36.5<br>36.0       | 8.19<br>8.24 | 34                       |
| 91          | 544         | 100        | r                  | p<br>p         | 3/21/29              | 25.8                | 36.0               | 8.25         | 12<br>30                 |
| 92          | 549         | 100        | r                  | p              | 3/29/29              | 26.2                | 36.0               | 8.28         | 28                       |
| 93          | 551         | 50         | oc                 | 'n             | 3/31/29              | 28.5                | 34.8               | 8.30         | 28                       |
| 93          | 552         | 0          | r                  | p              | 3/31/29              | 28.7                | 34.7               | 8.30         | <b>2</b> 8               |
| Samoa<br>94 | 555<br>558  | 0<br>50    | r                  | n              | 4/- 2/29<br>4/22/29  | 29.3                | 34.7               | 8.25         | 14                       |
| 95          | 559         | 100        | r                  | n<br>n         | 4/22/29              | 28.5                | 35.6               | 8.21         | 25                       |
| 94          | 561         | 50         | r                  | p              | 4/22/29              | 29.3                | 34.7               | 8.25         | 14                       |
| 95          | 563         | 50         | ос                 | 'n             | 4/24/29              | 29.3                | 34.9               | 8.24         | 16                       |
| 95          | 566         | 50         | r                  | p              | 4/24/29              | 29.3                | 34.9               | 8.24         | 16                       |
| 95<br>95    | 567<br>568A | 100        | r                  | p              | 4/24/29              | 28.5<br>(29.4       | 35.4               | 8.22<br>8.26 | 21<br>14)                |
| 96          | 568         | 0          | r<br>c             | n<br>n         | 4/25/29<br>4/26/29   | 29.3                | 34.7<br>35.3       | 8.23         | 12                       |
| 96          | 569         | 50         | c                  | n              | 4/26/29              | 29.2                | 35.3               | 8.23         | 12                       |
| 96          | 570         | 100        | oc                 | n              | 4/26/29              | 28.2                | 35.7               | 8.19         | 25                       |
| 96          | 571         | 0          | r                  | p              | 4/26/29              | 29.3                | 35.3               | 8.23         | 12                       |
| 96<br>96    | 572<br>573  | 50<br>100  | r                  | p              | 4/26/29<br>4/26/29   | 29.2<br>28.2        | 35.3<br>35.7       | 8.23<br>8.19 | 12<br>25                 |
| 97          | 575         | 50         | c                  | p<br>n         | 4/28/29              | 28.0                | 35.4               | 8.16         | 21                       |
| 97          | 577         | 0          | r                  | p              | 4/28/29              | 28.3                | 35.2               | 8.16         | 24                       |
| 97          | 578         | 50         | oc                 | p              | 4/28/29              | 28.0                | 35.4               | 8.16         | 21                       |
| 98          | 581         | 0          | oc                 | n              | 4/30/29              | 27.0                | 35.3               | 8.16         | 24                       |
| 98<br>99    | 584         | 0          | oc                 | þ              | 4/30/29<br>5/ 2/29   | 27.0<br>27.9        | - 35.3<br>34.9     | 8.16<br>8.21 | 24<br>12                 |
| 99          | 589<br>590  | 50         | oc<br>c            | n<br>n         | 5/ 2/29              | 27.8                | 34.9               | 8.22         | 12                       |
| 99          | 591         | 100        | c                  | n              | 5/ 2/29              | 27.8                | 35.0               | 8.22         | 17                       |
| 99          | 592         | 0          | oc                 | p              | 5/ 2/29              | 27.9                | 34.9               | 8.21         | 12                       |
| 99          | 594         | 100        | r                  | p              | 5/ 2/29              | 27.8                | 35.0               | 8.22         | 17                       |
| 99<br>100   | 595<br>596  | 0<br>50    | С                  | n              | 5/ 2/29<br>5/ 4/29   | 27.9<br>27.6        | 34.9<br>34.7       | 8.21<br>8.21 | 12<br>10                 |
| 100         | 597         | 100        | c<br>oc            | n<br>n         | 5/ 4/29              | 27.6                | 34.7               | 8.22         | 12                       |
| 100         | 598         | 0          | oc                 | p              | 5/ 4/29              | 27.7                | 34.7               | 8.21         | 10                       |
| 100         | 599         | 50         | oc                 | p              | 5/ 4/29              | 27.6                | 34.7               | 8.21         | 10                       |
| 100         | 602         | 100        | oc                 | p              | 5/ 4/29              | 27.6                | 34.7               | 8.22         | 12                       |
| 101         | 605         | 100        | r                  | n              | 5/ 7/29              | 25.2                | 35.1               | 8.23         | 8                        |
| 103<br>104  | 617<br>623  | 100<br>100 | r                  | n<br>n         | 5/11/29<br>5/13/29   | 24.8<br>25.3        | 35.2<br>35.3       | 8.25<br>8.21 | 5<br>7                   |
| 105         | 629         | 100        | oc                 | n              | 5/15/29              | 25.2                | 35.1               | 8.23         | 5                        |
| 106         | 635         | 100        | oc                 | n .            | 5/17/29              | 25.6                | 35.1               | 8.23         | 5                        |
| 107         | 642         | 0          | r                  | p              | 5/19/29              | 28.0                | 34.4               | 8.23         | 5<br>5<br>5              |
| 109         | 656         | 100        | oc                 | n              | 5/29/29              | 19.4                | 34.8               | 8.18         |                          |
| 110         | 665         | 50         | r                  | р              | 5/31/29              | 18.4                | 34.8               | 8.16         | 7                        |
|             |             |            |                    |                |                      |                     |                    |              |                          |

Table 47. Distributional and environmental records for Ceratium trichoceros--Concluded

| Station    | Sample              | Depth (m)  | Relative abundance | Appa-<br>ratus | Date                          | Temperature<br>(°C) | Salinity<br>(0/00) | pН                            | PO <sub>4</sub><br>mg/m <sup>3</sup> |
|------------|---------------------|------------|--------------------|----------------|-------------------------------|---------------------|--------------------|-------------------------------|--------------------------------------|
| 111        | 668                 | 0          | oc                 | n              | 6/ 3/29                       | 20.1                | 34.5               | 8.18                          | 5                                    |
| iii        | 670                 | 100        | r                  | n              | 6/ 3/29                       | 18.2                | 34.7               | 8.13                          | 13                                   |
| 112        | 674                 | 0          | oc                 | n              | 6/ 5/29                       | 23.2                | 34.6               | 8.22                          | 7                                    |
| 112        | 675                 | 50         | oc                 | n              | 6/ 5/29<br>6/ 5/29<br>6/ 5/29 | 21.7                | 34.6               | 8.23                          | 7                                    |
| 112        | 676                 | 100        | oc                 | n              | 6/ 5/29                       | 19.8                | 34.7               | 8.20                          | 8                                    |
| 113        | 680                 | 0          | c                  | s n            | 6/25/29                       | 24.2                | 34.5               | 8.25                          | 5                                    |
| 113        | 682                 | 100        | oc                 | n              | 6/25/29                       | 21.5                | 34.7               | 8,23                          | 5<br>8<br>5                          |
| 113        | 683                 | 0          | oc                 | р              | 6/25/29                       | 24.2                | 34.5               | 8.25                          | 5                                    |
| 113        | 684                 | 50         | г                  | p              | 6/25/29                       | 23.8                | 34.6               | 8.25                          | 5 8                                  |
| 113        | 685                 | 100        | $\mathbf{r}$       | p              | 6/25/29                       | 21.5                | 34.7               | 8.23                          | 8                                    |
| 131        | 793                 | 0          | r                  | p              | 9/ 6/29                       | 19.3                | 33.4               | 8.34                          | ***                                  |
| 132        | 799                 | 100        | $\mathbf{r}$       | n              | 9/ 8/29                       | 14.3                | 33.4               | 8.30                          | 16                                   |
| 133        | 806                 | 100        | r                  | n              | 9/10/29                       | 18.4                | 34.8               | 8.31                          | 7                                    |
| 133        | 314                 | 100        | r                  | þ              | 9/10/29                       | 18.4                | 34.8               | 8.31                          | 7                                    |
| 134        | 810                 | 100        | r                  | n              | 9/12/29                       | 18.1                | 34.6               | 8.34                          | 6                                    |
| 134        | 817<br>8 <b>22</b>  | 100<br>100 | r                  | р              | 9/12/29                       | 18.1                | 34.6               | 8.34                          | 6                                    |
| 135<br>136 | 822<br>829          | 100        | oc                 | n              | 9/14/29                       | 18.7<br>18.6        | 34.8<br>35.0       | 8. <b>34</b><br>8. <b>3</b> 9 | 5                                    |
| 137        | 837                 | 50         | r                  | n<br>p         | 9/16/29<br>9/18/29            | 24.4                | 35.1               | 8.34                          | 6<br>6<br>5<br>3<br>4                |
| 138        | 845                 | 100        | r                  | n              | 9/20/29                       | 22.2                | 34.8               | 8.31                          | 3                                    |
| 139        | 850                 | 50         | r                  | n              | 2/22/29                       | 25.8                | 34.9               | 8.31                          | 6                                    |
| 139        | 851                 | 100        | r                  | n              | 2/22/29<br>2/22/29            | 22.4                | 35.2               | 8.28                          | 6                                    |
| 140        | 858                 | 100        | r                  | n              | 10/ 3/29                      | 25.5                | 35.0               | 8.34                          | 7                                    |
| 140        | 862                 | 100        | r                  | р              | 10/ 3/29                      | 25.5                | 35.0               | 8.34                          | 7                                    |
| 141        | 871                 | 100        | r                  | p              | 10/ 5/29                      | 20.0                | 35.0               | 8.33                          | 5                                    |
| 142        | 874                 | 100        | С                  | n              | 10/ 7/29                      | 16.6                | 34.4               | 8.27                          | 7                                    |
| 142        | 878                 | 100        | r                  | р              | 10/ 7/29                      | 16.6                | 34.4               | 8.27                          | 3<br>6<br>7<br>7<br>5<br>7<br>7<br>7 |
| 142        | 8 <b>7</b> 9<br>888 | 100        | r                  | p              | 10/ 7/29                      | 16.6                | 34.4<br>34.7       | 8.27                          | 7                                    |
| 144<br>145 | 891                 | 50<br>50   | oc<br>r            | p<br>n         | 10/11/29<br>10/13/29          | 21.1<br>18.7        | 34.3               | 8.33<br>8.34                  | 6                                    |
| 146        | 898                 | 100        | r                  | n              | 10/15/29                      | 19.7                | 34.3               | 8.26                          | 6<br>7<br>5                          |
| 147        | 905                 | 100        | oc                 | n              | 10/17/29                      | 19.2                | 35.0               | 8.29                          | 5                                    |
| 150        | 930                 | 50         | oc                 | n              | 10/23/29                      | 22.8                | 34.8               | 8.35                          | 10                                   |
| 150        | 931                 | 100        | r                  | n              | 10/23/29                      | 19.6                | 34.6               | 8.32                          | 11                                   |
| 151        | 937                 | 0          | r                  | n              | 10/26/29                      | 26.0                | 34.0               |                               | ***                                  |
| 151        | 938                 | 50         | r                  | p              | 10/26/29                      | 18.3                | 34.4               |                               | •••                                  |
| 153        | 951                 | 0          | oc                 | n              | 10/29/29                      | 28.1                | 34.2               | 8.47                          | 7                                    |
| 153        | 952<br>953          | 50         | С                  | n              | 10/29/29                      | 28.1<br>20.5        | 34.4<br>34.7       | 8.39<br>8.28                  | 7 31                                 |
| 153<br>153 | 955<br>955          | 100        | oc<br>r            | n              | 10/29/29<br>10/29/29          | 28.1                | 34.4               | 8.39                          | 7                                    |
| 154        | 958                 | 0          | c                  | p<br>n         | 10/23/23                      | 28.3                | 34.2               | 8.39                          | 7                                    |
| 154        | 959                 | 50         | c                  | n              | 10/31/29                      | 28.2                | 34.2               | 8.40                          | ż                                    |
| 155        | 965                 | 0          | r                  | n              | 11/ 2/29                      | 27.8                | 34.9               | 8.29                          | 29                                   |
| 155        | 966                 | 50         | c                  | n              | 11/ 2/29                      | 27.7                | 34.9               | 8.30                          | 30                                   |
| 155        | 967                 | 100        | oc                 | n              | 11/ 2/29                      | 27.2                | 35.0               | 8.30                          | 35                                   |
| 156        | 972                 | 0          | oc                 | n              | 11/ 4/29                      | 27.6                | 35.0               | 8.34                          | 28                                   |
| 156        | 973                 | 50         | oc                 | n              | 11/ 4/29                      | 27.0                | 35.1               | 8.37                          | 46                                   |
| 156        | 974                 | 100        | oc                 | n              | 11/ 4/29                      | 26.4                | 35.1               | 8.30<br>8.27                  | 48<br>47                             |
| 157<br>157 | 978<br>980          | 100        | c<br>c             | n              | 11/ 6/29<br>11/ 6/29          | 27.1<br>26.8        | 35.3<br>35.3       | 8.30                          | 64                                   |
| 158        | 983                 | 0          | a<br>a             | n<br>n         | 11/ 8/29                      | 28.2                | 35.6               | 8.34                          | 36                                   |
| 158        | 984                 | 50         | c<br>C             | n              | 11/ 8/29                      | 28.2                | 35.6               | 8.39                          | 50                                   |
| 158        | 985                 | 100        | c                  | n              | 11/ 8/29                      | 27.6                | 35.9               | 8.39                          | 48                                   |
| 159        | 990                 | 0          | c                  | n              | 11/ 8/29<br>11/11/29          | 28.6                | 35.7               | 8.37                          | 15                                   |
| 159        | 991                 | 50         | c                  | n              | 11/11/29                      | 28.5                | 35.7               | 8.39                          | 15                                   |
| 159        | 992                 | 100        | ос                 | n              | 11/11/29                      | 28.0                | 35.7               | 8.37                          | 23                                   |
| 160        | 1000                | 0          | oc                 | n              | 11/13/29                      | 28.6                | 35.6               | 8.37                          | 12                                   |
| 160        | 1002                | 50         | С                  | n              | 11/13/29                      | 28.6                | 35.6               | 8.39                          | 15                                   |
| 160        | 1003                | 100        | oc                 | n              | 11/13/29                      | 28.5                | 35.7               | 8.44                          | 16                                   |

Table 48. Distributional and environmental records for Ceratium vultur

|             |             | Double       | D-1-4              | A              | 1                                    | l em                |                    |              |                                      |                    |
|-------------|-------------|--------------|--------------------|----------------|--------------------------------------|---------------------|--------------------|--------------|--------------------------------------|--------------------|
| Station     | Sample      | Depth<br>(m) | Relative abundance | Appa-<br>ratus | Date                                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> | Variety            |
| 1           | 1           | 0            | oc                 | n              | 5/12/28                              | 24.0                | 36.2               | 8.16         | 34                                   | v, t, p            |
| 1b          | 6           | 0            | c                  | n              | 5/18/28                              | (22.2               | 36.3               | 8.20         | 47)                                  | i, p               |
| 2           | 13          | 100          | r                  | , n            | 5/18/28                              | 19.8                | 36.4               | 8.21         | 33                                   | j, p<br>j, p       |
| 2<br>13a    | 15<br>89    | 0            | r                  | n              | 5/18/28                              | 20.5<br>(21.2       | 36.4               | 8.23         | 58                                   | p                  |
| 15          | 98          | 50           | r                  | n<br>p         | 8/ 9/28<br>8/11/28                   | 19.8                | 35.2<br>36.5       | 8.18<br>8.21 | 11)<br>8                             | v<br>p             |
| 15          | 99          | 100          | r                  | p              | 8/11/28                              | 18.4                | 36.4               | 8.20         | 19                                   | p                  |
| 15          | 100         | 0            | r                  | 'n             | 8/11/28                              | 24.8                | 36.4               | 8.21         | 11                                   | v                  |
| 15<br>15    | 101<br>102  | 50<br>100    | r<br>oc            | n<br>n         | 8/11/28<br>8/11/28                   | 19.8<br>18.4        | 36.5<br>36.4       | 8.21<br>8.20 | 8<br>19                              | p                  |
| 16          | 104         | 50           | r                  | p              | 8/13/28                              | 24.4                | 36.4               | 8.23         | 8                                    | p, v<br>t          |
| 16          | 106         | 0            | r                  | n              | 8/13/28                              | <b>25</b> .9        | 36.2               | 8.24         | 8                                    | v                  |
| 16<br>16    | 107<br>108  | 50<br>100    | oc<br>r            | n<br>n         | 8/13/28<br>8/13/28                   | 25.9<br>19.9        | 36.2<br>36.5       | 8.24<br>8.17 | 8<br>13                              | p, v               |
| 17          | 111         | 0            | r                  | n              | 8/15/28                              | 26.2                | 36.6               | 8.29         | 9                                    | p<br>v             |
| 17          | 112         | 50           | r                  | n              | 8/15/28                              | 21.9                | 36.6               | 8.28         | 12                                   | p                  |
| 17<br>18    | 113<br>116  | 100<br>100   | Г                  | n              | 8/15/28                              | 19.3                | 36.5               | 8.23         | 9                                    | p                  |
| 18          | 117         | 0            | r<br>oc            | p<br>n         | 8/17/28<br>8/17/28                   | 20.4<br>27.0        | 36.8<br>37.0       | 8.21<br>8.23 | 5<br>5                               | p<br>v             |
| 18          | 118         | 50           | ос                 | n              | 8/17/28                              | 22.4                | 36.8               | 8.24         | 5                                    | p, v               |
| 18          | 119         | 100          | r                  | n              | 8/17/28                              | 20.4                | 36.8               | 8.21         | 5                                    | V                  |
| 19<br>19    | 120<br>121  | 0<br>50      | r                  | p              | 8/20/28<br>8/20/28                   | 26.6<br>25.2        | 37.0<br>37.1       | 8.34<br>8.27 | 5<br>5                               | v<br>j             |
| 19          | 122         | 0            | oc                 | p<br>n         | 8/20/28                              | 26.6                | 37.0               | 8.34         | 5                                    | i i                |
| 19          | 123         | 50           | r                  | n              | 8/20/28                              | 25.2                | 37.1               | 8.27         | 5                                    | p, j               |
| 19<br>20    | 124<br>125  | 100          | oc                 | n              | 8/20/28<br>8/22/28                   | 22.4                | 37.0<br>36.6       | 8.25<br>8.37 | 5<br>5                               | p, j               |
| 20          | 126         | 50           | r                  | p<br>p         | 8/22/28                              | 26.0<br>25.8        | 36.6               | 8.26         | 3                                    | v,<br>t, v         |
| 20          | 128         | 0            | oc                 | 'n             | 8/22/28                              | 26.0                | 36.6               | 8.37         | 5                                    | v                  |
| 20          | 129         | 50           | r                  | n              | 8/22/28                              | 25.8                | 36.6               | 8.26         | 3                                    | p, v               |
| 20<br>20-21 | 130<br>131  | 100          | oc<br>r            | n<br>n         | 8/22/28<br>8/24/28                   | 22.6<br>(26.6       | 36.7<br>36.3       | 8.19<br>8.32 | 5<br>4)                              | p, r<br>r, v       |
| 21          | 132         | Ŏ            | r                  | p              | 8/24/28                              | 26.6                | 36.3               | 8.32         | $\hat{4}'$                           | v v                |
| 21<br>21    | 134         | 100          | r                  | p              | 8/24/28                              | 25.2                | 37.1               | 8.27         | 5                                    | j                  |
| 21          | 135<br>136  | 0<br>50      | C                  | n<br>n         | 8/24/28<br>8/24/28                   | 26.6<br>24.4        | 36.3<br>36.2       | 8.32<br>8.26 | 4                                    | v<br>v             |
| 21          | 137         | 100          | r                  | n              | 8/27/28                              | 21.0                | 36.8               | 8.20         | 7                                    | v                  |
| 22          | 139         | 0            | oc                 | p              | 8/27/28                              | 26.7                | 36.0               | 8.26         | 8                                    | t                  |
| 22<br>22    | 141<br>142  | 100          | r                  | p<br>n         | 8/27/28<br>8/27/28                   | 17.5<br>26.7        | 36.1<br>36.0       | 7.99<br>8.26 | 123<br>8                             | v<br>v             |
| 22          | 143         | 50           | r                  | n              | 8/29/28                              | 24.5                | 36.2               | 8.21         | 9                                    | r, v               |
| 22          | 144         | 100          | r                  | n              | 8/29/28                              | 17.5                | 36.1               | 7.99         | 123                                  | t, v               |
| 23<br>23    | 145<br>148  | 0            | r                  | p              | 8/29/28                              | 27.2                | <b>35.</b> 9       | 8.25         | 4                                    | t                  |
| 23          | 149         | 50           | oc<br>r            | n<br>n         | 8/ <b>29/2</b> 8<br>8/ <b>29/2</b> 8 | 27.2<br>20.9        | 35.9<br>36.0       | 8.25<br>8.14 | 4<br>13                              | t                  |
| 23          | 150         | 100          | r                  | n              | 8/29/28                              | 16.6                | 36.0               | 8.18         | 75                                   | r, j               |
| 24<br>24    | 155         | 50<br>100    | r                  | n              | 8/31/28                              | 23.1                | 36.0               | 8.14         | 8                                    | r                  |
| 25          | 156<br>157  | 0            | r                  | n<br>p         | 8/31/28<br>9/ 3/28                   | 15.6<br>27.5        | 35.6<br>35.6       | 7.96<br>8.31 | 99<br><b>5</b>                       | v<br>t             |
| 25          | 160         | 0            | oc                 | n              | 9/ 3/28                              | 27.5                | 35.6               | 8.31         | 5                                    | t                  |
| 25          | 161         | 50           | r                  | n              | 8/24/28                              | 21.5                | 36.0               | 8.22         | 12                                   | t, r               |
| 25<br>26    | 162<br>163  | 100<br>0     | r                  | n<br>p         | 8/24/28<br>9/ 5/28                   | 14.6<br>27.6        | 35.7<br>36.0       | 7.93<br>8.30 | 121<br>5                             | t                  |
| 26          | 164         | 50           | r                  | p              | 9/ 5/28                              | 24.1                | 36.1               | 8.21         | 5                                    | t                  |
| 26          | 165         | 100          | r                  | p              | 9/ 5/28                              | 14.9                | 35.6               | 8.11         | 40                                   | t                  |
| 26<br>27    | 166<br>171  | 0<br>50      | r                  | n<br>n         | 9/ 5/28<br>9/ 7/28                   | 27.6<br>26.0        | 36.0<br>36.2       | 8.30<br>8.30 | . 5                                  | t                  |
| 27          | 172         | 100          | oc                 | n              | 9/ 7/28                              | 17.7                | 36.0               | 8.09         | 46                                   | t, j               |
| 28          | 174         | 50           | r                  | p              | 9/11/28                              | 26.7                | 36.3               | 8.26         | 4                                    | t                  |
| 28<br>28    | 176<br>177  | 0<br>50      | 00                 | n              | 9/11/28                              | 27.6<br>26.7        | 36.3<br>36.3       | 8.29<br>8.26 | 4                                    | t                  |
| 28          | 178         | 100          | oc °               | n<br>n         | 9/11/28<br>9/11/28                   | 22.8                | 36.6               | 8.22         | $\frac{4}{7}$                        | r, v, j<br>t, v, r |
| 29          | 179         | 0            | r                  | p              | 9/13/28                              | 27.6                | 36.2               | 8.31         | 3                                    | t                  |
| 29<br>29    | 181<br>182  | 100          | r                  | p              | 9/13/28                              | 23.1<br>27.6        | 36.6               | 8.21<br>8.31 | 8                                    | r<br>+ i           |
| 29          | 183         | 50           | r                  | n<br>n         | 9/13/28<br>9/13/28                   | 27.5                | 36.2<br>36.2       | 8.29         | 3<br>8                               | t, j<br>j          |
| 29          | 184         | 100          | r                  | n              | 9/13/28                              | 23.1                | 36.6               | 8.21         | 8                                    | t, r               |
| 30          | 188         | 0            | С                  | n              | 9/15/28                              | 28.0                | 36.1               | 8.30         | 2                                    | t, j               |
| 30<br>30    | 189<br>190  | 50<br>100    | r                  | n<br>n         | 9/15/28<br>9/15/28                   | 27.8<br>24.1        | 36.1<br>36.4       | 8.29<br>8.10 | 3<br>20                              | t, j<br>r, v, j    |
| 31          | 191         | 0            | oc                 | n              | 10/ 3/28                             | 28.5                | 34.4               | 8.27         | 2                                    | t, r               |
| 32          | 194         | 0            | r                  | n              | 10/ 5/28                             | 28.0                | 36.0               | 8.23         | 2 2                                  | v                  |
| 32<br>32    | 195         | 50           | r                  | n              | 10/ 5/28                             | 27.2                | 36.0               | 8.24         | 2                                    | t                  |
| 33          | 196<br>197A | 100          | oc<br>r            | n<br>p         | 10/ 5/28<br>10/ 8/28                 | 22.2<br>28.5        | 36.4<br>35.6       | 8.10<br>8.23 | 30<br>4                              | t                  |
| 33          | 198         | 50           | r                  | n              | 10/ 8/28                             | 28.2                | 36.2               | 8.24         | $\hat{4}$                            | t                  |
|             |             |              |                    |                |                                      |                     |                    |              |                                      |                    |

Table 48. Distributional and environmental records for Ceratium vultur--Continued

| Station              | Sample                   | Depth (m)           | Relative abundance | Appa-<br>ratus | Date   | Temperature (°C)             | Salinity<br>(0/00)           | pН                   | PO <sub>4</sub> mg/m <sup>3</sup> | Variety        |
|----------------------|--------------------------|---------------------|--------------------|----------------|--|------------------------------|------------------------------|----------------------|-----------------------------------|----------------|
| 34<br>34<br>34<br>35 | 200<br>201<br>202<br>203 | 0<br>100<br>50<br>0 | r<br>oc<br>r       | n<br>n<br>n    | 10/ 9/28<br>10/ 9/28<br>10/ 9/28<br>10/26/28 | 28.5<br>20.5<br>25.0<br>27.4 | 35.9<br>36.6<br>36.5<br>29.7 | 8.28<br>8.16<br>8.21 | 2<br>16<br>3<br>15                | t<br>r<br>r, t |
| 35<br>35<br>35       | 204                      | 50                  | oc<br>r            | n<br>n         | 10/26/28                                     | 16.8                         | 34.7                         | 8.31<br>7.92<br>7.88 | 138                               | nt<br>nt, p    |
| 35<br>35<br>35a      | 205<br>206<br>208        | 100<br>0<br>0       | r<br>oc            | n<br>p         | 10/26/28<br>10/26/28<br>10/26/28             | 14.4<br>27.4<br>(27.4        | 34.9<br>29.7<br>29.7         | 8.31<br>8.31         | 189<br>15<br>15)                  | nt, v<br>nt    |
| 35-36<br>35-36       | 209<br>212               | 0                   | oc<br>oc           | n<br>n<br>n    | 10/26/28<br>10/26/28                         | (28.0<br>(28.0               | 32.2<br>32.2                 | 8.29                 | 85)<br>85)                        | nt<br>nt<br>nt |
| 36<br>37             | 214<br>217               | 50                  | r                  | n<br>n         | 10/30/28<br>11/ 1/28                         | 18.5<br>27.1                 | 34.5<br>31.7                 | 8.03<br>8.28         | 122<br>15                         | m<br>nt        |
| 37<br>37             | 218<br>219               | 50<br>100           | ос                 | n              | 11/ 1/28<br>11/ 1/28<br>11/ 1/28             | 18.8<br>15.1                 | 34.5<br>34.9                 | 8.00<br>7.82         | 121<br>153                        | nt<br>nt       |
| 37<br>38             | 221<br>223               | 50<br>50            | r<br>r<br>r        | n<br>p<br>n    | 11/ 1/28<br>11/ 3/28                         | 18.8<br>21.3                 | 34.5<br>34.4                 | 8.00<br>8.14         | 121<br>35                         | p, v           |
| 39<br>39             | 226<br>227               | 50<br>100           | r                  | n<br>n         | 11/ 6/28<br>11/ 6/28                         | 16.3<br>14.0                 | 34.6<br>35.0                 | 7.92<br>7.88         | 48<br>181                         | nt<br>nt       |
| 40<br>40             | 230<br>232               | 50                  | r                  | n              | 11/ 8/28<br>11/ 8/28                         | 15.3<br>22.2                 | 34.9<br>33.7                 | 7.87<br>8.21         | 161<br>24                         | nt; ?          |
| 40<br>41             | 233<br>237               | 50<br>100           | r                  | p<br>p<br>n    | 11/ 8/28<br>11/10/28                         | 15.3<br>14.5                 | 34.9<br>35.0                 | 7.87<br>7.91         | 161<br>152                        | nt<br>nt       |
| 41                   | 239<br>250               | 100                 | r                  | p<br>n         | 11/10/28<br>11/17/28                         | 14.5<br>20.7                 | 35.0<br>34.9                 | 7.91<br>8.03         | 152<br>38                         | nt<br>v        |
| 44<br>45             | 252<br>256               | 100                 | r                  | n<br>n         | 11/17/28<br>11/19/28                         | 13.8<br>22.4                 | 35.0<br>35.3                 | 7.85<br>8.12         | 70<br>38                          | v<br>nt        |
| 45<br>45             | 257<br>258               | 50<br>100           | r                  | n<br>n         | 11/19/28<br>11/19/28                         | 22.4<br>18.6                 | 35.2<br>35.1                 | 8.13                 | 46<br>50                          | nt<br>nt       |
| 45<br>47             | 259<br>266               | 0                   | r                  | p<br>n         | 11/19/28<br>11/23/28                         | 22.4<br>23.9                 | 35.2<br>36.0                 | 8.13<br>8.23         | 46                                | v<br>m         |
| 47<br>47             | 267<br>268               | 50<br>100           | r                  | n<br>n         | 11/23/28<br>11/23/28                         | 23.8<br>22.7                 | 36.0<br>36.2                 | 8.23<br>8.23         | 20<br>20                          | m<br>m         |
| 47<br>48             | 269<br>274               | 0                   | r                  | p<br>p         | 11/23/28<br>11/25/28                         | 23.9<br>23.6                 | 36.0<br>36.4                 | 8.23<br>8.23         | 17<br>13                          | m<br>v         |
| 50<br>51             | 284<br>295               | 0<br>100            | r                  | n<br>n         | 11/29/28<br>12/ 1/28                         | 23.2                         | 36.0<br>35.6                 | 8.23<br>8.22         | 13<br>17                          | v<br>nt, p     |
| 52<br>52             | 300<br>301               | 50<br>100           | r                  | n<br>n         | 12/ 3/28<br>12/ 3/28                         | 20.2<br>18.2                 | 35.6<br>35.2                 | 8.20<br>8.17         | 8                                 | p<br>p         |
| 53<br>53             | 304<br>305               | 50<br>100           | r                  | n<br>n         | 12/ 5/28<br>12/ 5/28                         | 21.2<br>19.9                 | 35.8<br>35.6                 | 8.20<br>8.19         | 13<br>13                          | p, j<br>p, j   |
| 53-54<br>53-54       | 307<br>308               | 0                   | r                  | n<br>n         | 12/ 6/28<br>12/ 6/28                         | (23.0<br>(23.0               | 35.6<br>35.0                 | 8.22<br>8.22         | 11)<br>11)                        | į              |
| 53-54<br>54          | 317<br>321               | 0<br>100            | r                  | n<br>n         | 12/12/28<br>12/14/28                         | (23.0<br>18.7                | 35.0<br>35.4                 | 8.22<br>8.16         | 11)<br>20                         | j              |
| 55<br>56             | 324<br>330               | 50<br>100           | r                  | n<br>n         | 12/16/28<br>12/18/28                         | 18.7<br>16.6                 | 35.0<br>34.8                 | 8.18<br>8.11         | 12<br>12                          | p<br>p, nt     |
| 56-57<br>57          | 334<br>337               | 0<br>100            | r                  | n<br>n         | 12/18/28<br>12/20/28                         | (20.0<br>14.3                | 34.6<br>34.4                 | 8.13<br>8.10         | 145)<br>40                        | nt<br>p        |
| 66<br>85             | 415<br>510               | 100<br>0            | r                  | p<br>n         | 1/ 7/29<br>3/ 6/29                           | 17.8<br>27.9                 | 34.9<br>36.2                 | 8.12<br>8.22         | 21<br>40                          | p<br>t         |
| 86<br>87             | 517<br>521               | 50<br>0             | r<br>oc            | n<br>n         | 3/ 9/29<br>3/11/29                           | 27.4<br>27.8                 | 36.2<br>36.1                 | 8.29<br>8.28         | 17<br>17                          | t              |
| 8 <b>7</b><br>88     | 522<br>526 ·             | 50<br>0             | oc                 | n<br>n         | 3/11/29<br>3/21/29                           | 26.5<br>28.5                 | 36.1<br>35.9                 | 8.26<br>8.23         | 20<br>16                          | t              |
| 88<br>89             | 527<br>528               | 50<br>0             | oc<br>r            | n<br>n         | 3/21/29<br>3/23/29                           | 28.4<br>28.4                 | 35.9<br>35.6                 | 8.25<br>8.25         | 13<br>21                          | t              |
| 89<br>89             | 529<br>530               | 50<br>0             | r                  | n<br>p         | 3/23/29<br>3/23/29                           | 28.6<br>28.4                 | 35.8<br>35.6                 | 8.27<br>8.25         | 12<br>21                          | t, v           |
| 89<br>90             | 532<br>5 <b>33</b>       | 0                   | oc                 | n<br>n         | 3/25/29<br>3/25/29                           | (28.4<br>28.5                | 35.5<br>35.5                 | 8.26<br>8.27         | 21)<br>21                         | t<br>t, v      |
| 90<br>90             | 534<br>535               | 50<br>0             | r                  | n<br>p         | 3/25/29<br>3/25/29                           | 28.6<br>28.5                 | 35.6<br>35.5                 | 8.26<br>8.27         | 21<br>21                          | t<br>t, j      |
| 91<br>91             | 540<br>541               | 0<br><b>5</b> 0     | oc                 | n<br>n         | 3/27/29<br>3/27/29                           | 28.7<br>28.5                 | 35.1<br>35.2                 | 8.30<br>8.30         | 21<br>24                          | į              |
| 91<br>91             | 542<br>543               | 0<br>50             | r                  | p              | 3/27/29<br>3/27/29                           | 28.7<br>28.5                 | 35.1<br>35.2                 | 8.30<br>8.30         | 21<br>24                          | t              |
| 92<br>92             | 545<br>546               | 0<br>50             | oc<br>oc           | n<br>n         | 3/29/29<br>3/29/29                           | 28.5<br>28.4                 | 35.3<br>35.4                 | 8.29<br>8.29         | 28<br>28                          | t              |
| 93<br>93             | 550<br>551               | 0<br>50             | r                  | n<br>n         | 3/31/29<br>3/31/29                           | 28.7<br>28.5                 | 34.7<br>34.8                 | 8.30<br>8.30         | 28<br>28                          | t              |
| 95<br>95             | 563<br>564               | 50<br>100           | r                  | n<br>n         | 4/24/29 4/24/29                              | 29.3<br>29.6                 | 34.9<br>35.8                 | 8.24<br>8.27         | 16<br>29                          | v<br>v         |
| 98<br>98             | 581<br>582               | 0<br>50             | r                  | n<br>n         | 4/30/29<br>4/30/29                           | 27.0<br>26.9                 | 35.3<br>35.3                 | 8.16<br>8.16         | 24<br>28                          | r              |
| 99<br>99             | 591<br>595               | 100<br>0            | r                  | n<br>n         | 5/ 2/29<br>5/ 2/29                           | 27.8<br>27.9                 | 35.0<br>34.9                 | 8.22<br>8.21         | 17<br>12                          | t<br>v         |

Table 48. Distributional and environmental records for Ceratium vultur--Continued

|            |                             | Depth           | Relative  | Appa-                   |                                  | Temperature  | Salinity             |              | PO <sub>4</sub>       |               |
|------------|-----------------------------|-----------------|-----------|-------------------------|----------------------------------|--------------|----------------------|--------------|-----------------------|---------------|
| Station    | Sample                      | (m)             | abundance | ratus                   | Date                             | (°C)         | (0/00)               | pH           | mg/m <sup>3</sup>     | Variety       |
| 100        | 596                         | 100             | r         | n                       | 5/ 4/29                          | 27.6         | 34.7                 | 8.22         | 12                    | i             |
| 100        | 597                         | 100             | r         | n                       | 5/ 4/29                          | 27.6         | 34.7                 | 8.22         | 8                     | j             |
| 101        | 603                         | 0               | r         | n                       | 5/ 7/29                          | 26.3         | 34.7                 | 8.24         | 8                     | ť             |
| 101        | 604                         | 50              | oc        | n                       | 5/ 7/29                          | 26.2         | 34.7                 | 8.24         | 8                     | t             |
| 101        | 605 .                       | 100             | oc        | n                       | 5/ 7/29                          | 25.2         | 35.1                 | 8.23<br>8.24 | 8                     | t, v          |
| 102<br>102 | 609<br>610                  | 0<br><b>5</b> 0 | oc<br>oc  | n<br>n                  | 5/ 9/29<br>5/ 9/29               | 25.8<br>25.8 | 35.0<br>35.0         | 8.24         | 8                     | t, v<br>t     |
| 102        | 611                         | 100             | r         | n                       | 5/ 9/29                          | 25.6         | 35.0                 | 8.23         | 8                     | t, v          |
| 102        | 613                         | 50              | r         | p                       | 5/ 9/29                          | <b>25</b> .8 | 35.0                 | 8.24         | 8                     | v             |
| 102        | 614                         | 100             | r         | p                       | 5/ 9/29                          | 25.6         | 35.0                 | 8.23         | 8                     | p             |
| 103        | 615                         | 0               | r         | n                       | 5/11/29                          | 26.0         | 35.0<br>35.2         | 8.25<br>8.25 | 5<br>5                | t             |
| 103<br>103 | 616<br>617                  | 50<br>100       | oc<br>r   | n<br>n                  | 5/11/29<br>5/11/29               | 35.8<br>24.8 | 35.2                 | 8.25         | 5                     | t             |
| 103        | 620                         | 100             | r         | p                       | 5/11/29                          | 24.8         | 35.2                 | 8.25         | 5                     | ť             |
| 104        | 621                         | 0               | r         | n.                      | 5/11/29                          | 26.1         | 35.2                 | 8.24         | 7                     | j             |
| 104        | 622                         | 50              | r         | n                       | 5/13/29                          | 25.8         | 35.2                 | 8.24         | 7                     | t .           |
| 104        | 623                         | 100             | r '       | n                       | 5/13/29<br>5/15/29               | 35.3<br>26.8 | 35.3<br>34.9         | 8.21<br>8.23 | 7<br>5                | t, j<br>t     |
| 105<br>105 | 627<br>628                  | 50<br>50        | oc<br>oc  | . n<br>n                | 5/15/29                          | 26.8         | 34.9                 | 8.23         | 5                     | t             |
| 105        | 629                         | 100             | oc        | n                       | 5/15/29                          | 25.2         | 35.1                 | 8.23         | 5                     | t             |
| 106        | 633                         | 0               | r         | n                       | 5/17/29                          | 27.2         | 35.0                 | 8.23         | 5                     | t             |
| 106        | 634                         | 50              | r         | n                       | 5/17/29                          | 27.0         | 35.0                 | 8.23         | 5                     | t, j          |
| 106        | 635                         | 100             | oc        | n                       | 5/17/29                          | 25.6<br>27.2 | 35.1<br>35.0         | 8.23<br>8.23 | 5<br>5                | t             |
| 106<br>107 | <b>63</b> 6<br><b>63</b> 9  | 0               | r<br>c    | p<br>n                  | 5/17/29<br>5/19/29               | 28.0         | 34.4                 | 8.23         | 5                     | t, v          |
| 107        | 640                         | 50              | oc        | n                       | 5/19/29                          | 27.9         | 34.4                 | 8.23         | 4                     | ť             |
| 107        | 641                         | 100             | oc        | n                       | 5/19/29                          | 26.8         | 34.9                 | 8.23         | 4                     | t             |
| 107        | 642                         | 0               | r .       | p                       | 5/19/29                          | 28.0         | 34.4                 | 8.23         | 5                     | j.            |
| 108        | 646                         | 0               | oc        | n                       | 5/27/29                          | 28.4         | 35.0<br>35.0         | 8.25<br>8.24 | 4 4                   | Ţ, ]          |
| 108<br>108 | 647<br>648                  | 50<br>100       | r<br>oc   | n<br>n                  | 5/27/29<br>5/27/29               | 26.8<br>25.2 | 35.0<br>35.0         | 8.23         | 4                     | t, j<br>t     |
| 109        | 654                         | 0               | r         | n                       | 5/29/29                          | 27.4         | 35.0                 | 8.23         | 3                     | i             |
| 109        | 655                         | 50              | r         | n                       | 5/29/29                          | 23.1         | 35.0                 | 8.22         | 3                     | ŧ             |
| 109        | 656                         | 100             | oc        | n                       | 5/29/29                          | 19.4         | 35.0                 | 8.18         | 5                     | t             |
| 110        | 666                         | 100             | r         | n                       | 5/31/29                          | 17.9         | 34.8                 | 8.14         | 5                     | t             |
| 111<br>112 | 668<br>674                  | 0               | r         | p                       | 6/ 3/29<br>6/ 5/29               | 20.1<br>23.2 | 34.7<br>34.5         | 8.18<br>8.22 | 7                     | t<br>t        |
| 112        | 675                         | 50              | r         | n<br>n                  | 6/ 5/29                          | 21.7         | 34.6                 | 8.23         | ż                     | ť             |
| 112        | 676                         | 100             | r         | n                       | 6/ 5/29                          | 19.8         | 34.7                 | 8.20         | 8                     | t, j          |
| 113        | 680                         | 0               | oc        | n                       | 6/25/29                          | 24.2         | 34.5                 | 8.25         | 5                     | t             |
| 113        | 681                         | 50              | oc        | n                       | 6/25/29                          | 23.8         | 34.6                 | 8.25         | 5<br>16               | t             |
| 132        | 799                         | 100             | r         | n                       | 9/ 8/29<br>9/10/29               | 14.3<br>22.7 | 33.4<br>34.7         | 8.30<br>8.47 | 7                     | р<br><b>v</b> |
| 133<br>133 | 804<br>805                  | 0<br>50         | oc<br>r   | n<br>n                  | 9/10/29                          | 20.8         | 34.7                 | 8.23         | 7                     | v             |
| 134        | 808                         | 0               | oc        | n                       | 9/12/29                          | 22.9         | 34.7                 | 8.34         | 6                     | v, j          |
| 134        | 809                         | 50              | r         | n                       | 9/12/29                          | 19.8         | 34.6                 | 8.34         | 6                     | V             |
| 134        | 810                         | 100             | oc        | n                       | 9/12/29                          | 18.1         | 34.6                 | 8.34         | 6                     | V             |
| 135        | 820                         | 0               | r         | p                       | 9/14/29                          | 23.8<br>21.5 | 35.1<br>35.0         | 8.37<br>8.37 | 7<br>5                | v<br>v        |
| 135<br>135 | 821<br>822                  | 50<br>100       | r<br>oc   | n<br>n                  | 9/14/29<br>9/14/29               | 18.7         | 34.8                 | 8.34         | 5                     | v             |
| 135        | 825                         | 50              | r         | p                       | 9/14/29                          | 21.5         | 35.0                 | 8.37         | 5                     | v             |
| 136        | 827                         | 0               | 1         | 'n                      | 9/16/29                          | 24.6         | 35.4                 | 8.37         | 3                     | v             |
| 136        | 828                         | 50              | r         | n                       | 9/16/29                          | 21.4         | 35.1                 | 8.39         | 3                     | v             |
| 136        | 829                         | 100             | С         | n                       | 9/16/29                          | 18.6<br>25.5 | 35.0<br>35.0         | 8.39<br>8.39 | · 3                   | į             |
| 137<br>137 | 836<br>837                  | 0<br>50         | c<br>oc   | n<br>n                  | 9/18/29<br>9/18/29               | 24.4         | 35.1                 | 8.34         |                       | t, v, j       |
| 137        | 838                         | 100             | c         | n                       | 9/18/29                          | 21.5         | 35.1                 | 8.30         | 4<br>5<br>5<br>5<br>3 | t, j          |
| 137        | 842                         | 100             | r         | p                       | 9/18/29                          | 21.5         | 35.1                 | 8.30         | 5                     | t             |
| 138        | 843                         | 0               | oc        | n                       | 9/20/29                          | 26.1         | 34.8                 | 8.35         | 5                     | t             |
| 138        | 844                         | 50              | oc        | n                       | 9/20/29<br>9/22/29               | 25.6<br>26.7 | 34.7<br>34.8         | 8.30<br>8.34 | 6                     | t             |
| 139<br>139 | 849<br>850                  | 0<br>50         | oc<br>oc  | n<br>n                  | 9/22/29                          | 25.8         | 34.9                 | 8.31         | 6                     | t             |
| 139        | 851                         | 100             | oc        | n                       | 9/22/29                          | 22.4         | 35.2                 | 8.28         | 6                     | t             |
| 139        | 855                         | 100             | r         | p                       | 9/22/29                          | 22.4         | 35.2                 | 8.28         | 6                     | t             |
| 140        | 856                         | 0               | oc        | n                       | 10/ 3/29                         | 26.9         | 35.0                 | 8.42         | 7                     | ţ, j          |
| 140        | 857                         | 50              | oc        | n                       | 10/ 3/29<br>10/ 3/29             | 26.9<br>25.5 | 35.0<br>35.0         | 8.39<br>8.34 | 7                     | ť t           |
| 140<br>140 | 8 <b>5</b> 8<br>8 <b>62</b> | 100<br>100      | oc<br>r   | n<br>p                  | 10/ 3/29                         | 25.5         | 35.0                 | 8.34         | 7                     | ŧ             |
| 141        | 864                         | 0               | c         | n                       | 10/ 5/29                         | 25.9         | 35.2                 | 8.34         | 5                     | t             |
| 141        | 865                         | 50              | oc        | n                       | 10/ 5/29                         | 25.9         | 35.2                 | 8.34         | 5<br>5                | t, j          |
| 141        | 868                         | 0               | r         | p                       | 10/ 5/29                         | 25.9         | 35.2                 | 8.34         | 5                     | t             |
| 141        | 870                         | 50              | r         | $\overline{\mathbf{p}}$ | 10/ 5/29<br>10/ 7/29             | 24.8<br>21.8 | 35.3<br>34.8         | 8.34<br>8.30 | 5<br>5                | t<br>p        |
|            | OPPO                        |                 |           |                         |                                  |              |                      |              |                       |               |
| 142        | 873<br>874                  | 50<br>100       | r         | n<br>n                  |                                  |              |                      | 8.27         | 7                     | p, j          |
|            | 873<br>874<br>883           | 100<br>100      | oc<br>oc  | n<br>n                  | 10/ 7/29<br>10/ 7/29<br>10/ 9/29 | 16.6<br>13.8 | 34.4<br>34.1<br>34.3 |              | 7<br>· 10<br>7        | p, j<br>p     |

Table 48. Distributional and environmental records for Ceratium vultur -- Concluded

| Station | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(0/00) | рН    | PO <sub>4</sub> mg/m <sup>3</sup> | Variety |
|---------|-------------|-----------|--------------------|----------------|----------|---------------------|--------------------|-------|-----------------------------------|---------|
| 147     | 903         | 0         | r                  | n              | 10/17/29 | 23.3                | 35.3               | 8.26  | 8                                 | t       |
| 147     | 904         | 50        | r                  | n              | 10/17/29 | 23.1                | 35.3               | 8.29  | 5                                 | p       |
| 147     | 905         | 100       | $\mathbf{r}$       | n              | 10/17/29 | 19.2                | 35.0               | 8.29  | 5                                 | p       |
| 148     | 911         | 50        | r                  | n              | 10/19/29 | 23.0                | 35.1               |       |                                   | p       |
| 148     | 912         | 100       | r                  | n              | 10/19/29 | 20.0                | 35.0               | ***** | ***                               | p, nt   |
| 149     | 920         | 0         | oc                 | n              | 10/21/29 | 23.5                | 35.0               | 8.34  | 6                                 | r       |
| 149     | 921         | 50        | oc                 | n              | 10/21/29 | 23.3                | 35.0               | 8.37  | 6                                 | r       |
| 149     | 922         | 100       | oc                 | n              | 10/21/29 | 20.3                | 34.9               | 8.38  | 6                                 | г       |
| 150     | 929         | 0         | r                  | n              | 10/23/29 | 25.6                | 34.7               | 8.39  | 7                                 | nt      |
| 150     | 930         | 50        | r                  | n              | 10/23/29 | <b>22.</b> 8        | 34.8               | 8.35  | 10                                | p       |
| 150     | 931         | 100       | r                  | n              | 10/23/29 | 19.6                | 34.6               | 8.32  | 10                                | p, nt   |
| 151     | 938         | 50        | , <b>r</b>         | n              | 10/26/29 | 18.3                | 34.4               |       |                                   | p       |
| 152     | 945         | 50        | c                  | n              | 10/27/29 | 14.2                | 34.5               | 7.87  | 53                                | ŧ       |
| 152     | 946         | 100       | С                  | n              | 10/27/29 | 11.4                | 34.7               | 7.76  | 75                                | t       |
| 153     | 952         | 50        | oc                 | n              | 10/29/29 | 28.1                | 34.4               | 8.39  | 7                                 | t, j    |
| 155     | 9 <b>65</b> | 0         | r                  | n              | 10/29/29 | 28.1                | 34.4               | 8.39  | 7                                 | t       |
| 155     | 966         | 50        | r                  | p              | 11/ 2/29 | 27.7                | 34.9               | 8.30  | 30                                | v       |
| 155     | 967         | 100       | r                  | n              | 11/ 2/29 | 27.2                | 35.0               | 8.30  | 35                                | v       |
| 156     | 974         | 100       | r                  | n              | 11/ 4/29 | 26.4                | 35.1               | 8.30  | 48                                | v       |
| 160     | 1000        | 0         | r                  | n              | 11/13/29 | 28.6                | 35.6               | 8.37  | 12                                | t       |

Abbreviations: v=var. vultur; j=var. japonicum; p=var. pavillardii; r=var. recurvum; t=var. sumatranum; m=var. regulare; nt=var. reversum.

Table 49. Distributional and environmental records for Ceratium horridum

| Station     | Sample   | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(0/00) | pH           | PO <sub>4</sub><br>mg/m <sup>3</sup> | Variety   |
|-------------|----------|-----------|-----------------------|----------------|--------------------|---------------------|--------------------|--------------|--------------------------------------|-----------|
| 1           | 1        | 0         | r                     | 'n             | 5/12/28            | . 24.0              | 36.2               | 8.16         | 34                                   | mh        |
| 1           | 4        | 0         | Γ                     | n              | 5/12/28            | (24.0               | 36.2               | 8.16         | 34)                                  | c         |
| 1a          | 5        | 0         | r                     | n              | 5/12/28            | (22.2               | 36.3               | 8.20         | 46)                                  | c         |
| 1b          | 6        | 0         | oc                    | n              | 5/12/28            | (22.2               | 36.3               | 8.20         | 46)                                  | h         |
| 1b<br>1b    | 7<br>8   | 50<br>100 | - oc                  | n              | 5/12/28            | (22.0<br>(20.0      | 36.4<br>36.5       | 8.21         | 38)                                  | c, m      |
| 3           | 19       | 100       | r                     | n<br>n         | 5/12/28<br>5/21/28 | 13.6                | 35.9               | 8.18<br>8.10 | 36)<br>48                            | c<br>h, m |
| 3           | 20       | 0         | r                     | n              | 5/21/28            | 15.5                | 36.1               | 8.15         | 99                                   | c, m      |
| 5a          | 33       | ŏ         | oc                    | n              | 5/31/28            | (12.4               | 35.6               | 8.15         | 21)                                  | h         |
| 6           | 36       | 50        | r                     | n              | 5/31/28            | 11.6                | 35.6               | 8.12         | 32                                   | ĥ         |
| 6           | 37       | 100       | oc                    | n              | 5/31/28            | 11.3                | 35.6               | 8,08         | 41                                   | h         |
| 6b          | 44       | 0         | r                     | n              | 6/ 2/28            | (12.4               | 35.6               | 8.15         | 21)                                  | h         |
| 6b          | 46       | 0         | oc                    | n              | 6/ 2/28            | (12.4               | 35.6               | 8.15         | 21)                                  | h         |
| 6c          | 47       | 100       | r                     | n              | 6/ 2/28            | (11.3               | 35.6               | 8.08         | 41)                                  | h         |
| 6f          | 53       | 0         | oc                    | n              | 7/ 9/28            | (10.6               | 35.4               | 8.11         | 28)                                  | h         |
| 6g          | 54       | 0         | oc                    | n              | 7/10/28            | (10.6               | 35.4               | 8.11         | 28)                                  | h         |
| 6h          | 55       | 0         | a                     | n              | 7/11/28            | (10.6               | 35.4               | 8.11         | 28)                                  | h         |
| 7 7         | 56       | 0         | oc                    | n              | 7/11/28            | 10.6                | 35.4               | 8.11         | 28                                   | h         |
| 7           | 57<br>58 | 50<br>100 | oc                    | n              | 7/11/28            | 8.2                 | 35.2<br>35.2       | 8.03<br>8.04 | 47                                   | m         |
| e e         | 59       | 0         | c                     | n              | 7/11/28<br>7/15/28 | 8.1<br>10.3         | 35.2               | 7.93         | 57<br>13                             | h<br>h    |
| 8<br>8      | 60       | 50        | a<br>a                | n<br>n         | 7/15/28            | 9.1                 | 35.2               | 7.95         | 27                                   | h         |
| 8           | 61       | 100       | c                     | n              | 7/15/28            | 8.4                 | 35.3               | 7.95         | 54                                   | h         |
| 9           | 64       | 0         | c                     | n              | 7/28/28            | 11.2                | 35.1               | 8.08         | 20                                   | h         |
| 8<br>9<br>9 | 65       | 50        | c                     | n              | 7/28/28            | 8.4                 | 35.1               | 7.96         | 55                                   | h         |
| 9           | 66       | 100       | oc                    | n              | 7/28/28            | 7.6                 | 35.1               | 7.98         | 56                                   | h         |
| 9           | 67       | 0         | Г                     | n              | 7/28/28            | 11.2                | 35.1               | 8.08         | 20                                   | h         |
| 10          | 68       | 0         | a                     | n              | 7/30/28            | 10.9                | 34.9               | 8.08         | 28                                   | m         |
| 10          | 70       | 100       | С                     | n              | 7/30/28            | 6.6                 | 35.0               | 7.95         | 52                                   | h         |
| 11          | 73       | 0         | oc                    | n              | 8/ 1/28            | 10.7                | 34.9               | 8.06         | 27                                   | h         |
| 11          | 74       | 50        | oc                    | n              | 8/ 1/28            | 7.3                 | 34.9               | 7.92         | 63                                   | h         |
| 11          | 75       | 0         | r                     | p              | 8/ 1/28            | 10.7                | 34.9               | 8.06         | 27                                   | h         |
| 11<br>11    | 76<br>77 | 50<br>100 | oc                    | p              | 8/ 1/28<br>8/ 1/28 | 7.3<br>6.3          | 34.9<br>35.1       | 7.92         | 63<br>66                             | h         |
| 11a         | 78       | 0         | r                     | p<br>n         | 8/ 5/28            | (8.4                | 33.6               | 8.10         | 27)                                  | h<br>h    |
| 14          | 91       | 100       | oc<br>r               |                | 5/ 9/28            | 14.0                | 35.6               | 8.06         | 34                                   | mh        |
| 14          | 92       | 50        | oc                    | p<br>p         | 5/ 9/28            | 15.0                | 35.1               | 8.18         | 16                                   | m         |
| 14          | 93       | 0         | r                     | p              | 5/ 9/28            | 21.2                | 35.2               | 8.18         | 11                                   | m         |
| 14          | 94       | 100       | r                     | n              | 5/ 9/28            | 14.0                | 35.6               | 8.06         | 34                                   | m         |
| 14          | 95       | 50        | oc                    | n              | 5/ 9/28            | 15.0                | 35.1               | 8.18         | 16                                   | c         |
| 16          | 104      | 50        | r                     | p              | 8/13/28            | 24.4                | 36.4               | 8.23         | 8                                    | mh        |
| 16          | 108      | 100       | ос                    | n              | 8/13/28            | 19.9                | 36.5               | 8.17         | 13                                   | mh        |
| 18          | 116      | 100       | r                     | p              | 8/17/28            | 20.4                | 36.8               | 8.21         | 5                                    | mh        |
| 18          | 119      | 100       | r                     | n              | 8/17/28            | 20.4                | 36.8               | 8.21         | 5                                    | mh        |
| 21          | 134      | 100       | r                     | p              | 8/24/28            | 21.0                | 36.8               | 8.20         | 7                                    | h         |

Table 49. Distributional and environmental records for Ceratium horridum--Continued

| ~              | Table 48           | Depth          | Relative     | Appa-       |                               | Temperature          | Salinity             | 1                    |                                   |                           |
|----------------|--------------------|----------------|--------------|-------------|-------------------------------|----------------------|----------------------|----------------------|-----------------------------------|---------------------------|
| Station        | Sample             | (m)            | abundance    | ratus       | Date                          | (°C)                 | (0/00)               | pН                   | PO <sub>4</sub> mg/m <sup>3</sup> | Variety                   |
| 24<br>24       | 152<br>155         | 50<br>50       | r            | p           | 8/31/28<br>8/31/28            | 23.1                 | 36.0                 | 8.14                 | 8                                 | m                         |
| 25             | 161                | 50             | oc           | n<br>n      | 8/31/28                       | 23.1<br>21.5         | 36.0<br>36.0         | 8.14<br>8.22         | 8<br>12                           | m<br>m, mh, l             |
| 25<br>26       | 162<br>163         | 100            | oc           | n           | 8/31/28<br>9/ 5/28            | 14.6<br>27.6         | 35.7                 | 7.93                 | 121                               | h                         |
| 26             | 164                | 50             | r            | p<br>p      | 9/ 5/28                       | 24.1                 | 36.0<br>36.1         | 8.30<br>8.21         | 5<br>5                            | h<br>m                    |
| 27<br>28       | 172<br>178         | 100<br>50      | r            | n<br>p      | 9/ 7/28<br>9/11/28            | 17.7<br>26.7         | 36.0<br>36.3         | 8.09<br>8.26         | 46<br>4                           | h<br>h mh                 |
| 31             | 193                | 100            | r            | n           | 10/ 3/28                      | 23.4                 | 36.5                 | 8.19                 | 28                                | h, mh<br>mh               |
| 32<br>35       | 196<br><b>20</b> 4 | 100<br>50      | r            | n<br>n      | 10/ 5/28<br>10/26/28          | 22.2<br>16.8         | 36.4<br>34.7         | $8.10 \\ 7.92$       | 30<br>138                         | mh<br>mh                  |
| 35<br>36       | 205                | 100            | г            | n           | 10/26/28                      | 14.4                 | 34.9                 | 7.88                 | 189                               | h                         |
| 36             | 214<br>215         | 50<br>100      | r            | n<br>n      | 10/30/28<br>10/30/28          | 18.5<br>14.4         | 34.5<br>34.9         | 8.03<br>7.85         | 122<br>149                        | c<br>c                    |
| 37<br>37       | 219<br>220         | 100            | r            | n           | 11/ 1/28<br>11/ 1/28          | 15.1<br>27.1         | 34.9<br>31.7         | 7.82<br>8.28         | 153<br>15                         | mi                        |
| 38             | 222                | 0              | r            | p<br>n      | 11/ 3/28                      | 26.5                 | <b>32.</b> 9         | 8.33                 | 20                                | $\mathbf{m}$ $\mathbf{m}$ |
| 40<br>40       | 229<br>231         | 0<br>100       | r            | n<br>n      | 11/ 8/28<br>11/ 8/28          | 22.2<br>13.9         | 33.7<br>35.0         | 8.21<br>7.85         | 24<br>159                         | m<br>m                    |
| 40             | 232                | 0              | r            | p           | 11/ 8/28                      | 22.2                 | 33.7                 | 8.21                 | 24                                | m                         |
| 40<br>41       | 233<br>235         | 50<br>0        | r            | p<br>n      | 11/ 8/28<br>11/10/28          | 15.3<br>20.4         | 34.9<br>34.2         | 7.87<br>8.11         | 161<br>32                         | m<br>m                    |
| 41a<br>42      | 240<br>241         | 0              | `oc          | n           | 11/13/28                      | (19.5                | 34.4                 | 8.09                 | 38)                               | h, m                      |
| 42             | 243                | 100            | r            | n<br>n      | 11/13/28<br>11/13/28          | 18.7<br>13.8         | 34.7<br>35.0         | 8.06<br>7.91         | 45<br>150                         | h<br>mh, h                |
| 43<br>43       | 245<br>246         | 50<br>100      | r            | n<br>n      | 11/15/28<br>11/15/28          | 17.0<br>13.6         | 34.9<br>35.0         | 7.93<br>7.90         | 80<br>92                          | h í<br>h                  |
| 43             | 247                | 0              | r            | p           | 11/15/28                      | 19.6                 | 34.8                 | 8.09                 | 52                                | mh                        |
| 44<br>44       | 250<br>251         | 0<br>50        | r            | n<br>n      | 11/17/28<br>11/17/28          | 20.7<br>20.4         | 34.9<br>34.9         | 8.03<br>8.04         | 38<br>34                          | h<br>h                    |
| 44             | 253                | 0              | r            | p           | 11/17/28                      | 20.7                 | 34.9                 | 8.03                 | 38                                | h                         |
| 44<br>45       | 254<br>256         | 50<br>0        | r<br>oc      |             | 11/17/28<br>11/19/28          | 20.4<br>22.4         | 34.9<br>35.3         | 8.04<br>8.12         | 34<br>38                          | m, h<br>h                 |
| 45<br>45       | 257<br>258         | 50<br>100      | oc           | n           | 11/19/28                      | 22.4<br>18.6         | 35.2                 | 8.13                 | 46<br>50                          | c, h                      |
| 45             | 260                | 50             | oc<br>r      | p           | 11/19/28<br>11/19/28          | 22.4                 | 35.1<br>35.2         | 3.00<br>8.13         | 46                                | mh,* h                    |
| 46<br>46       | 264<br>265         | 0<br>50        | r            |             | 11/21/28<br>11/21/28          | 23.3<br>23.2         | 35.3<br>35.3         | 8.16<br>8.16         | 36<br>40                          | h<br>h                    |
| 47             | 266                | 0              | r            | ñ           | 11/23/28                      | 23.9                 | 36.0                 | 8.23                 | 17                                | h                         |
| 47<br>47       | 267<br>268         | 50<br>100      | r            |             | 11/23/28<br>11/23/28          | 23.8<br>22.7         | 36.0<br>36.2         | 8.23<br>8.23         | 20<br>20                          | h<br>h                    |
| 47             | 269<br>270         | 0<br>50        | r            | p           | 11/23/28                      | 23.9                 | 36.0                 | 8.23                 | 17                                | h                         |
| 61             | 364                | 50             | r<br>c       |             | 11/23/28<br>12/28/28          | 23.8<br>14.0         | 36.0<br>34.0         | 8.23<br>8.05         | 20<br>60                          | c<br>h                    |
| 61<br>61       | 365<br>366         | 100            | c<br>oc      |             | 12/28/28<br>12/28/28          | 10.8<br>16.9         | 34.0<br>34.0         | 8.03<br>8.05         | 80<br>46                          | h<br>h                    |
| 61             | 367                | 50 .           | r            | p           | 12/28/28                      | 14.0                 | 34.0                 | 8.05                 | 60                                | h                         |
| 62<br>62       | 372<br>376         | 50<br>100      | r            |             | 12/30/28<br>12/30/28          | 16.2<br>13.1         | 34.3<br>34.2         | 8.10<br>8.06         | 28<br>48                          | h<br>h                    |
| 66             | 413<br>414         | 0<br>50        | r            | p           | 1/ 7/29<br>1/ 7/29            | 19.4                 | 34.7                 | 8.10                 | 29<br>29                          | h                         |
| 69             | 426                | 100            | r            | p<br>n      | 1/12/29                       | 17.8<br>14.6         | 34.8<br>34.8         | 8.10<br>7.86         | 198                               | h<br>h                    |
| 69<br>70       | 429<br>432         | 100<br>50      | r            | p<br>n      | 1/12/29<br>1/13/29            | 14.6<br>15.4         | 34.8<br>35.0         | 7.86<br>7.88         | 198<br>178                        | h<br>h                    |
| 70             | 433                | 100            | ос           | n           | 1/13/29                       | 12.6                 | 34.8                 | 7.68                 | 233                               | h                         |
| 70<br>71       | 435<br>440         | 50<br>100      | r<br>oc      | p<br>n      | 1/13/29<br>2/ 6/29            | 15.4<br>13.9         | 35.0<br>35.0         | 7.88<br>7.71         | 178<br>220                        | h<br>h                    |
| 72<br>72       | 444                | 50             | r            | n           | 2/ 8/29                       | 18.7                 | 35.4                 | 8.12                 | 60                                | h                         |
| 72             | 445<br>447         | 100<br>50      | oc<br>r      | n<br>p      | 2/ 8/29<br>2/ 8/29            | 14.8<br>18.7         | 35.0<br>35.4         | 7.94<br>8.12         | 154<br>60                         | h<br>h                    |
| 72<br>73       | 448<br>454         | 100<br>50      | r            | p<br>p      | 2/ 8/29<br>2/10/29            | 14.8<br>18.7         | 35.0<br>35.4         | 7.94<br>8.05         | 154<br>122                        | h<br>h                    |
| 77             | 473                | 0              | r            | p           | 2/18/29                       | 23.7                 | 36.0                 | 8.19                 | 16                                | h                         |
| 77<br>78       | 474<br>479         | 50<br>50       | $\mathbf{r}$ | p<br>q      | 2/18/29<br>2/20/29            | 23.5<br>23.8         | 36.0<br>36.1         | 8.19<br>8.14         | 16<br>32                          | c, h                      |
| 81<br>81       | 491                | 0<br>50        | r            | n           | 2/26/29                       | 26.5                 | 35.8                 | 8.19                 | 38                                | h                         |
| 81             | 492<br>493         | 0              | r            | n<br>.p     | 2/26/29<br>2/26/29            | 26.4<br>26.5         | 35.9<br>35.8         | 8.19<br>8.19         | 38<br>38                          | h<br>h                    |
| 81<br>81       | 494<br>495         | 50<br>100      | oc<br>r      | p<br>p      | 2/26/29<br>2/26/29            | 26.4<br>23.6         | 35.9<br>36.2         | 8.19<br>8.18         | 38<br>36                          | h<br>h                    |
| 93             | 553                | 100            | r            | g           | 3/3/29                        | 27.6                 | 35.8                 | 8.27                 | 29                                | c                         |
| 95             | 563                | 50             | r            | n           | 4/24/29                       | 29.3                 | 34.9                 | 8.24                 | 16                                | h                         |
| 96             | 568                | 0              | Г            | n           | 4/25/29                       | 29.3                 | 35.3                 | 8.23                 | 12                                | h                         |
| 96<br>96<br>96 |                    | 0<br>50<br>100 | · oc         | n<br>n<br>n | 4/25/29<br>4/26/29<br>4/26/29 | 29.3<br>29.2<br>28.2 | 35.3<br>35.3<br>35.7 | 8.23<br>8.23<br>8.19 | 12<br>12<br>25                    | h<br>h<br>c, h            |

Table 49. Distributional and environmental records for Ceratium horridum--Concluded

| Station | Sample     | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> | Variety                |
|---------|------------|-----------|--------------------|----------------|----------|---------------------|--------------------|------|--------------------------|------------------------|
| 97      | 579        | 100       | r                  | р              | 4/28/29  | 27.6                | 35.6               | 8.15 | 25                       | h                      |
| 98      | 581        | 0         | oc                 | 'n             | 4/30/29  | 27.0                | 35.3               | 8.16 | 24                       | h                      |
| 98      | 584        | 0         | r                  | p              | 4/30/29  | 27.0                | 35.3               | 8.16 | 24                       | h                      |
| 98      | 585        | 50        | oc                 | p              | 4/30/29  | 26.9                | 35.3               | 8.16 | 28                       | h                      |
| 99      | 592        | 0         | r                  | p              | 5/ 2/29  | 27.8                | 35.0               | 8.22 | 17                       | mh                     |
| 100     | 597        | 100       | r                  | n              | 5/ 4/29  | 27.6                | 34.7               | 8.22 | 12                       | mh                     |
| 111     | 668        | 0         | r                  | n              | 6/ 3/29  | 20.1                | 34.5               | 8.18 | 5                        | mh                     |
| 113     | 684        | 50        | r                  | p              | 6/25/29  | 23.8                | 34.6               | 8.25 | 5                        | С                      |
| 113     | 685        | 100       | r                  | p              | 6/25/29  | 21.5                | 34.7               | 8.23 | 8                        | С                      |
| 114     | 686        | .0        | r                  | n              | 6/27/29  | 19.9                | 34.3               | 8.15 | 7                        | m                      |
| 114     | 690        | 50        | oc                 | p              | 6/27/29  | 16.2                | 34.6               | 8.04 | 63                       | m                      |
| 126     | 766        | 100       | r                  | p              | 7/21/29  | 6.4                 | 32.7               | 8.01 | 100                      | h                      |
| 127     | 769        | 100       | ос                 | n              | 7/23/29  | 8.2                 | <b>32.</b> 8       | 8.00 | 72                       | h, mh                  |
| 127     | 772        | 100       | ос                 | р.             | 7/23/29  | 8.2                 | <b>32.</b> 8       | 8.00 | 72                       | mh                     |
| 130     | <b>783</b> | 100       | c                  | n              | 9/ 4/29  | 8.8                 | 33.7               | 8.06 | 176                      | $\mathbf{m}\mathbf{h}$ |
| 130     | 784        | 100       | oc                 | р              | 9/ 4/29  | 8.8                 | 33.7               | 8.06 | 176                      | m                      |
| 135     | 822        | 100       | r                  | n              | 9/14/29  | 18.7                | 34.8               | 8.34 | 5                        | С                      |
| 149     | 922        | 100       | oc                 | n              | 10/21/29 | 20.3                | 34.9               | 8.38 | 6                        | С                      |
| 151     | 937        | _0        | r                  | n              | 10/26/29 | 26.0                | 34.0               |      | ***                      | С                      |
| 151     | 938        | 50        | r                  | n              | 10/26/29 | 18.3                | 34.4               |      |                          | С                      |
| 151     | 939        | 100       | С                  | n              | 10/26/29 | 12.5                | 34.6               |      | ***                      | C                      |
| 152     | 945        | 50        | С                  | n              | 10/27/29 | 14.2                | 34.5               | 7.87 | 53                       | h, c                   |
| 152     | 946        | 100       | С                  | n              | 10/27/29 | 11.4                | 34.7               | 7.76 | 75                       | h                      |
| 152     | 947        | 100       | r                  | · p            | 10/27/29 | 11.4                | 34.7               | 7.76 | 75                       | h .                    |
| 153     | 952        | 50        | ос                 | n              | 10/29/29 | 28.1                | 34.4               | 8.39 | 7                        | mh                     |
| 153     | 953        | 100       | r                  | n              | 10/29/29 | 20.5                | 34.7               | 8.28 | 31                       | mh                     |
| 157     | 978        | 0         | r                  | n              | 11/ 6/29 | 27.8                | 35.3               | 8.27 | 47                       | mh                     |
| 157     | 979        | 50        | oc                 | n              | 11/ 6/29 | 27.1                | 35.2               | 8.32 | 60                       | mh                     |

\*Or c. Abbreviations: c=var. claviger; m=var. molle; h=var. horridum mh=intergrade between molle and horridum.

Table 50. Distributional and environmental records for Ceratium tenue

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date     | Temperature (°C) | Salinity<br>(0/00) | pН   | PO <sub>4</sub> mg/m <sup>3</sup> | Variety |
|---------|--------|-----------|--------------------|----------------|----------|------------------|--------------------|------|-----------------------------------|---------|
| 1.4     | 0.5    | 50        |                    |                | 8/ 9/28  | 15.0             | 35.1               | 8.18 | 16                                | A .     |
| 14      | 95     | 50        | r                  | n              |          | 19.8             | 36.5               | 8.21 | 8                                 | ţ, i    |
| 15      | 97     | 50        | r                  | p              | 8/11/28  |                  | 36.5               | 8.21 | 8                                 | 1       |
| 15      | 98     | 50        | r                  | p              | 8/11/28  | 19.8             |                    | 8.20 |                                   | L       |
| 15      | 99     | 100       | r                  | p              | 8/11/28  | 18.4             | 36.4               |      | 19                                | į.      |
| 16      | 103    | 0         | r                  | p              | 8/13/28  | 25.9             | 36.2               | 8.24 | 8                                 | 1       |
| 17      | 110    | 50        | oc                 | þ              | 8/15/28  | 21.9             | 36.6               | 8.24 | 12                                | 1       |
| 18      | 114    | 0         | oc                 | p              | 8/17/28  | 27.0             | 37.0               | 8.23 | 5                                 | 1       |
| 18      | 116    | 100       | oc                 | p              | 8/17/28  | 20.4             | 36.8               | 8.21 | 5                                 | 1       |
| 18      | 118    | 50        | oc                 | n              | 8/17/28  | 22.4             | 36.8               | 8.24 | 5                                 | 1       |
| 18      | 119    | 100       | oc                 | n              | 8/17/28  | 20.4             | 36.8               | 8.21 | . 5                               | 1       |
| 19      | 120    | 0         | oc                 | p              | 8/20/28  | 26.6             | 37.0               | 8.34 | 5                                 | 1       |
| 19      | 121    | 50        | oc                 | p              | 8/20/28  | 25.2             | 37.1               | 8.27 | 5                                 | i       |
| 19      | 123    | 50        | oc                 | n              | 8/20/28  | 25.2             | 37.1               | 8.27 | 5                                 | i       |
| 19      | 124    | 100       | С                  | n              | 8/20/28  | 22.4             | 37.0               | 8.25 | 5                                 | i       |
| 20      | 127    | 100       | r                  | p              | 8/22/28  | 22.6             | 36.7               | 8.19 | 5                                 | i       |
| 20      | 129    | 50        | oc                 | n              | 8/22/28  | 25.8             | 36.6               | 8.26 | 3                                 | i       |
| 20      | 130    | 100       | C                  | n              | 8/22/28  | 22.6             | 36.7               | 8.19 | 5                                 | i       |
| 20-21   | 131    | 0         | r                  | n              | 8/24/28  | (26.6            | 36.3               | 8.32 | 4)                                | i       |
| 21      | 132    | 0         | r                  | р              | 8/24/28  | 26.6             | 36.3               | 8.32 | 4                                 | t       |
| 21      | 136    | 50        | r                  | 'n             | 8/24/28  | 24.4             | 36.2               | 8.26 | 4                                 | i       |
| 21      | 137    | 100       | oc                 | n              | 8/24/28  | 21.0             | 36.8               | 8.20 | 7                                 | t       |
| 22      | 140    | 50        | r                  |                | 8/27/28  | 24.5             | 36.2               | 8.21 | 9                                 | t       |
| 23      | 146.   | 50        | oc                 | p              | 8/29/28  | 20.9             | 36.0               | 8.14 | 13                                | i       |
| 24      | 152    | 50        | r                  | p              | 8/31/28  | 23.1             | 36.0               | 8.14 | 8                                 | i       |
| 25      | 161    | 50        | r                  | 'n             | 9/ 3/28  | 21.5             | 36.0               | 8.22 | 12                                | i       |
| 26      | 164    | 50        | oc                 | p              | 9/ 5/28  | 24.1             | 36.1               | 8.21 | 5                                 | i       |
| 26      | 165    | 100       | oc                 | p              | 9/ 5/28  | 14.9             | 35.6               | 8.11 | 40                                | i       |
| 27      | 168    | 50        | oc                 | p              | 9/ 7/28  | 26.0             | 36.2               | 8.30 | 4                                 | i       |
| 27      | 171    | 50        | г                  | 'n             | 9/ 7/28  | 26.0             | 36.2               | 8.30 | 4                                 | t       |
| 30      | 186    | 50        | oc                 | p              | 9/15/28  | 27.8             | 36.1               | 8.29 | 3                                 | i       |
| 30      | 190    | 100       | r                  | n              | 9/15/28  | 24.1             | 36.4               | 8.10 | 20                                | t       |
| 31      | 191    | 0         | r                  | n              | 10/ 3/28 | 28.5             | 34.4               | 8.27 | 2                                 | i       |
| 31      | 192    | 50        | r                  | n              | 10/ 3/28 | 28.2             | 35.4               | 8.23 | 2                                 | i       |
| 32      | 195    | 50        | r                  | n              | 10/ 5/28 | 27.2             | 36.0               | 8.24 | 2                                 | i       |
| 32      | 196    | 100       | oc                 | n              | 10/ 5/28 | 22.2             | 36.4               | 8.10 | 30                                | i       |
| 34      | 201    | 100       | oc                 | n              | 10/ 9/28 | 20.5             | 36.6               | 8.16 | 16                                | t       |
| 34      | 201    | 50        | oc                 | n              | 10/ 9/28 | 25.0             | 36.5               | 8.21 | 3                                 | i       |
| 34      | 202    | 90        | UC                 | 31             | 10/ 0/20 | 20.0             | 00.0               | 0.01 |                                   |         |

Table 50. Distributional and environmental records for Ceratium tenue--Continued

| Station          | Sample                    | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO <sub>4</sub><br>mg/m <sup>3</sup> | Variety |
|------------------|---------------------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------------------|---------|
|                  | L                         | (111)     | dominative         | Tatab          | -                    | ( 0)                | (0,00)             |              | 1115/111                             |         |
| 37               | 221                       | 50        | r                  | p              | 11/ 1/28             | 18.8                | 34.5               | 8.00         | 121                                  | t, i    |
| 41a<br>47        | 240<br>268                | 0<br>100  | oc<br>r            | n<br>n         | 11/13/28<br>11/23/28 | (19.5<br>22.7       | 34.4<br>36.2       | 8.08<br>8.23 | 38)<br>20                            | t<br>i  |
| 48               | 275                       | 50        | r                  | p              | 11/25/28             | 23.6                | 36.4               | 8.24         | 16                                   | i       |
| 48               | 276                       | 100       | oc                 | p              | 11/25/28             | 22.7                | 36.3               | 8.26         | 16                                   | i       |
| 49<br>49         | 277<br>278                | 0<br>50   | r                  | n              | 11/27/28             | 23.4                | 36.2               | 8.27         | 13                                   | i<br>i  |
| 49               | 279                       | 100       | r                  | n<br>n         | 11/27/28<br>11/27/28 | 22.6<br>21.6        | 36.1<br>35.9       | 8.26<br>8.26 | 13<br>13                             | i       |
| 49               | 281                       | 50        | oc ·               | p              | 11/27/28             | 22.6                | 36.1               | 8.26         | 13                                   | i       |
| 49               | 282                       | 100       | oc                 | p              | 11/27/28             | 21.6                | 35.9               | 8.26         | 13                                   | i       |
| 50<br>50         | 286<br>288                | 100<br>50 | r<br>oc            | n<br>p         | 11/29/28<br>11/29/28 | 20.5<br>22.0        | 35.7<br>35.9       | 8.22<br>8.23 | 13<br>13                             | t       |
| 50               | 289                       | 100       | oc                 | p              | 11/29/28             | 20.5                | 35.7               | 8.22         | 13                                   | i       |
| 51               | 294                       | 50        | oc                 | n              | 12/ 1/28             | 20.5                | 35.6               | 8.22         | 17                                   | i       |
| 51<br>51         | 297<br>298                | 50<br>100 | oc<br>oc           | p<br>p         | 12/ 1/28<br>12/ 1/28 | 20.5<br>20.0        | 35.6<br>35.6       | 8.22<br>8.22 | 17<br>17                             | 1       |
| 53               | 304                       | 50        | oc                 | n              | 12/ 5/28             | 21.2                | 35.8               | 8.20         | 13                                   | i       |
| 53               | 305                       | 100       | ос                 | n              | 12/ 5/28             | 19.9                | 35.6               | 8.19         | 13                                   | i       |
| 53<br>53-54      | 306<br>308                | 0         | r                  | p<br>n         | 12/ 5/28<br>12/ 6/28 | 22.6<br>(23.0       | 35.7<br>35.6       | 8.22<br>8.22 | 13<br>11)                            | i       |
| 55               | 324                       | 50        | oc                 | n              | 12/16/28             | 18.7                | 35.0               | 8.18         | 12                                   | i       |
| 55               | 325                       | 100       | $\mathbf{r}$       | n              | 12/16/28             | 18.7                | 35.0               | 8.18         | 12                                   | i       |
| 5 <b>5</b><br>56 | 327<br>329                | 50<br>50  | r                  | p<br>n         | 12/16/28<br>12/18/28 | 18.7<br>18.5        | 35.0<br>35.1       | 8.18<br>8.14 | 12<br>9                              | i<br>i  |
| 56               | 330                       | 100       | oc                 | n              | 12/18/28             | 16.6                | 34.8               | 8.11         | 12                                   | i       |
| 56               | 331                       | 0         | $\mathbf{r}$       | p              | 12/18/28             | 20.8                | 34.9               | 8.13         | 9                                    | i       |
| 56               | 332                       | 50        | oc                 | p              | 12/18/28             | 18.5                | 35.1               | 8.14         | 9                                    | i       |
| 56<br>57         | <b>333</b><br><b>33</b> 9 | 100<br>50 | r<br>oc            | p<br>p         | 12/18/28<br>12/20/28 | 16.6<br>15.6        | 34.8<br>34.3       | 8.11<br>8.14 | 12<br>21                             | i<br>i  |
| 57               | 340                       | 100       | r                  | p              | 12/20/28             | 14.3                | 34.4               | 8.10         | 40                                   | i       |
| 60               | 359                       | 0         | r                  | p              | 12/26/28             | 15.0                | 34.0               | 8.07         | 50                                   | t       |
| 61<br>61-62      | 368<br>369                | 100       | r                  | p<br>n         | 12/28/28<br>12/28/28 | 10.8<br>(16.9       | 34.0<br>34.0       | 8.03<br>8.05 | 80<br>46)                            | t       |
| 63               | 380                       | 50        | r                  | n              | 1/ 1/29              | 17.0                | 34.6               | 8.08         | 25                                   | i       |
| 63               | 381                       | 100       | r                  | n              | 1/11/29              | 15.6                | 34.6               | 8.08         | 24                                   | i       |
| 63<br>63         | 383<br>384                | 50<br>100 | oc<br>r            | p<br>p         | 1/ 1/29<br>1/ 1/29   | 17.0<br>15.6        | 34.6<br>34.6       | 8.08<br>8.08 | 25<br>24                             | i<br>i  |
| 64               | 395                       | 50        | r                  | n              | 1/ 3/29              | 17.2                | 34.6               | 8.12         | 29                                   | i       |
| 64               | 396                       | 100       | r                  | n              | 1/ 3/29              | 15.8                | 34.5               | 8.10         | 32                                   | i       |
| 64<br>64         | 399<br>400                | 50<br>100 | oc<br>r            | p<br>p         | 1/ 3/29<br>1/ 3/29   | 17.2<br>15.8        | 34.6<br>34.5       | 8.12<br>8.10 | 29<br>32                             | i<br>i  |
| 65               | 406                       | 50        | oc                 | n              | 1/ 5/29              | 16.5                | 34.5               | 8.10         | 25                                   | î       |
| 65               | 407                       | 100       | r                  | n              | 1/ 5/29              | 14.8                | 34.3               | 8.10         | 34                                   | i       |
| 65<br>65         | 408<br>409                | 0<br>50   | r                  | p<br>p         | 1/ 5/29<br>1/ 5/29   | 20.2<br>16.5        | 34.5<br>34.5       | 8.10<br>8.10 | 24<br>25                             | i<br>i  |
| 65               | 410                       | 100       | r                  | p              | 1/ 5/29              | 14.8                | 34.3               | 8.10         | 34                                   | i       |
| 66               | 412                       | 100       | r                  | n              | 1/ 7/29              | 17.8                | 34.9               | 8.12         | 21                                   | i       |
| 67<br>67         | 416<br>418                | 0<br>100  | oc<br>r            | n<br>n         | 1/ 8/29<br>1/ 8/29   | 19.3<br>16.2        | 34.9<br>34.6       | 8.11<br>8.05 | 21<br>40                             | i<br>i  |
| 68               | 419                       | 0         | r                  | n              | 1/10/29              | 19.2                | 35.1               | 8.14         | 29                                   | î       |
| 68               | 421                       | 100       | r                  | n              | 1/10/29              | 16.5                | 34.8               | 8.13         | 34                                   | į       |
| 68<br>75         | 422<br>464                | 0<br>100  | oc                 | p<br>n         | 1/10/29<br>2/14/29   | 19.2<br>17.8        | 35.1<br>35.4       | 8.14<br>8.00 | 29<br>75                             | i       |
| 76               | 469                       | 100       | r                  | n              | 2/16/29              | 21.2                | 35.8               | 8.12         | 45                                   | î<br>i  |
| 78               | 475                       | 0         | r                  | n              | 2/20/29              | 24.6                | 36.0               | 8.17         | 32                                   | i       |
| 78<br>78         | 476<br>477                | 50<br>100 | r<br>oc            | n<br>n         | 2/20/29<br>2/20/29   | 23.8<br>21.9        | 36.1<br>36.2       | 8.14<br>8.14 | 32<br>34                             | i<br>i  |
| 78               | 478                       | 0         | oc                 | p              | 2/20/29              | 24.6                | 36.0               | 8.17         | 32                                   | i       |
| 78               | 479                       | 50        | oc                 | p              | 2/20/29              | 23.8                | 36.1               | 8.14         | 32                                   | i       |
| 78<br>79         | 480<br>482                | 100<br>50 | oc<br>oc           | p<br>n         | 2/20/29<br>2/22/29   | 21.9<br>24.5        | 36.2<br>36.1       | 8.14<br>8.17 | 34<br>34                             | i<br>i  |
| 79               | 483                       | 100       | r                  | n              | 2/22/29              | 21.8                | 36.2               | 8.13         | 45                                   | i       |
| 79               | 484                       | 0         | r                  | р              | 2/22/29              | 25.2                | 36.0               | 8.17         | 34                                   | i       |
| 80<br>80         | 486<br>488                | 0         | oc                 | n              | 2/24/29<br>2/24/29   | 26.0<br>26.0        | 35.9<br>35.9       | 8.20<br>8.20 | 36<br>36                             | i<br>i  |
| 80               | 490                       | 100       | oc                 | p<br>p         | 2/24/29              | 23.4                | 36.2               | 8.16         | 32                                   | i       |
| 81               | 492                       | 50        | r                  | n              | 2/26/29              | 26.4                | 35.9               | 8.19         | 38                                   | i       |
| 81<br>81         | 493<br>495                | 0<br>100  | oc<br>r            | p              | 2/26/29<br>2/26/29   | 26.5<br>23.6        | 35.8<br>36.2       | 8.19<br>8.18 | 38<br>36                             | i<br>i  |
| 82               | 496                       | 0         | r                  | p<br>n         | 2/28/29              | 27.2                | 36.3               | 8.21         | 34                                   | i       |
| 82               | 498                       | 0         | oc                 | p              | 2/28/29              | 27.2                | 36.3               | 8.21         | 34                                   | i       |
| 82<br>83         | 500<br>504                | 100<br>50 | 00                 | p              | 2/28/29<br>3/ 2/29   | 24.4<br>27.4        | 36.5<br>36.2       | 8.19<br>8.24 | 34<br>25                             | i       |
| 84               | 505                       | 0         | oc<br>oc           | p<br>n         | 3/4/29               | 27.8                | 36.2               | 8.23         | 24                                   | i       |
| 84               | 507                       | 0         | oc                 | p              | 3/ 4/29              | 27.8                | 36.2               | 8.23         | 24                                   | i       |
| 84               | 508                       | 50        | r                  | р              | 3/ 4/29              | 27.5                | 36.4               | 8.21         | 24                                   | i       |

Table 50. Distributional and environmental records for Ceratium tenue--Continued

| S   S   S   S   S   S   S   S   S   S  |         |        |     |    |    |           |               |      |      | 111404                               |         |
|--|---------|--------|-----|----|----|-----------|---------------|------|------|--------------------------------------|---------|
| 85 513 500 oc p 3/6/20 27.8 36.2 8.22 40 1   85 514 500 r r p 3/6/20 27.8 36.2 8.23 40 1   86 515 0 r r p 3/6/20 28.3 36.2 8.23 40 1   87 524 50 r r p 3/11/29 28.5 36.5 8.29 20   87 524 50 r r p 3/11/29 28.5 36.0 8.24 50   89 531 100 r r p 3/23/29 28.4 35.0 8.23 10   92 546 50 r r p 3/23/29 28.4 35.0 8.24 10   92 547 0 r r p 3/23/29 28.5 35.3 8.29 28   92 547 0 r r p 3/31/29 28.5 35.3 8.29 28   92 547 0 r r p 3/31/29 28.5 35.3 8.29 28   92 545 100 oc p 3/23/29 28.5 35.3 8.29 28   93 55 100 r r p 3/31/29 28.5 35.3 8.29 28   94 553 100 oc n 4/25/29 28.5 35.3 8.29 28   94 553 100 oc n 4/25/29 28.5 35.3 8.20 14   95 568A 0 oc n 4/25/29 28.2 35.7 8.19 25   95 57 100 oc p 4/25/29 28.2 35.7 8.19 25   95 57 100 oc p 4/25/29 28.2 35.7 8.19 25   95 57 100 oc p 4/25/29 28.2 35.7 8.19 25   95 58B 10 or r n 4/25/29 28.2 35.7 8.19 25   95 57 100 oc p 4/25/29 28.2 35.7 8.19 25   95 58B 10 or r n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 1 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 1 4/25/29 28.2 35.7 8.19 25   95 58B 10 or n 1 4/25/29 28.3 35.8 8.19 22   95 58B 10 or n 1 4/25/29 28.2 35.3 8.16 24   95 58B 10 or n 1 4/25/29 28.2 35.3 8.16 24   95 58B 10 or n 1 4/25/29 28.2 35.3 8.16 28.2 35   95 58B 10 or n 1 4/25/29 28.2 35.3 8.16 28.2 35   95 58B 10 or n 1 4/25/29 28.2 35.3 8.16 28.3 8.16 28.3 8   95 58B 10 or n 1 4/25/29 28.2 35.3 8.16 28.3 8   95  | Station | Sample |     |    |    | Date      |               |      | рH   | PO <sub>4</sub><br>mg/m <sup>3</sup> | Variety |
| 86 514 100 r p 3,6/20 25.2 36.3 8.23 42 10 8.6 815 0 r p 3,9/20 25.2 36.3 36.2 8.29 20 1   | 0.6     | 540    |     |    |    | 0 . 0 .00 |               |      | 0.00 |                                      |         |
| 86 515 0 r n 3,79/28 (28.3 36.2 8.29 20) i   |         |        |     |    |    |           |               |      |      |                                      | i       |
| 86 518 0 r p 3,79/29 28.5 36.1 8.29 20 i   |         |        |     |    |    | 3/ 9/29   | 20.2<br>(28.3 |      |      |                                      | 1       |
| 87 524 50 r p 3,711/29 26.5 36.1 8.26 20 i s 87 525 100 r p 3,711/29 26.5 36.1 8.26 20 i s 88 534 4 100 r p 9 3/23/28 23.9 36.0 8.23 20 i s 88 534 4 100 r p 9 3/23/28 28.4 35.4 8.6 8.23 120 i s 9 2 546 50 r p 9 3/23/28 28.4 35.4 8.29 28 38 3 1 9 2 546 50 r p 9 3/23/28 28.4 35.4 8.29 28 38 3 1 9 2 546 50 r p 9 3/23/28 28.5 35.3 8.29 28 38 3 1 9 3 552 0 r r p 3/23/28 28.5 35.3 8.29 28 3 1 9 3 552 0 r r p 3/31/29 28.5 35.3 8.29 28 3 1 9 3 553 100 r r p 3/31/29 28.7 34.7 8.30 28 3 1 9 3 553 100 r r p 3/31/29 28.7 34.7 8.30 28 3 1 9 3 553 100 r r p 3/31/29 28.7 35.6 8.27 29 i s 9 3 553 100 r r p 3/31/29 28.7 35.6 8.26 27 29 i s 9 3 553 100 r r p 3/24/28 28.2 35.7 8.19 255 1 4 9 9 6 570 100 r r p 4/28/28 28.2 2 35.7 8.19 255 1 9 9 7 576 100 r r p 4/28/28 28.2 27.6 35.6 8.15 25 1 9 9 7 576 100 r r p 4/28/28 27.6 35.6 8.15 25 1 9 9 5 599 100 r r p 4/28/28 27.6 35.6 8.15 25 1 9 9 5 599 100 r r p 4/28/28 27.6 35.6 8.15 25 1 9 9 5 599 100 r r p 4/28/28 27.6 35.6 8.15 25 1 9 9 5 599 100 r r p 4/28/28 27.6 35.6 8.15 25 1 9 9 5 599 50 0 r r p 4/30/29 27.0 35.3 8.19 25 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   |         |        |     |    |    | 3/ 9/29   |               |      | 8.29 |                                      | i       |
| 87 525 100 r p 3,711/29 23.9 36.0 8.23 20 1 99 581 100 r p 3,727/29 25.8 36.0 8.24 12 1 99 544 100 oc p 3,727/29 25.8 36.0 8.24 12 1 99 544 100 oc p 3,727/29 25.8 36.0 8.25 30 1 90 92 547 50 r r p 3,727/29 25.8 36.0 8.25 30 1 90 93 552 0 r p p 3,727/29 25.8 36.0 8.25 30 1 90 93 552 0 r p p 3,727/29 26.2 28.4 35.4 35.4 8.22 28 28 1 93 552 0 r p p 3,727/29 26.2 28.4 35.4 35.4 8.22 28 28 1 93 552 0 r p p 3,727/29 26.2 26.7 34.7 8.30 28 28 1 93 553 100 oc p 3,731/29 27.6 35.8 8.27 29 1 94 559 100 r n 4,727/29 22.5 35.6 8.21 25 1 95 558  |         |        |     |    |    |           |               |      |      |                                      | i       |
| 89   | 87      | 525    | 100 |    |    | 3/11/29   |               |      | 8.23 |                                      | i       |
| 92 546 50 r n 3,25,29 28.4 33.4 8.29 28 i 92 547 0 r p 3,725,29 28.5 33.3 8.29 28 i 93 525 547 0 r p 3,725,28 26.2 33.0 8.28 28 i 93 52 549 100 r p 3,725,28 26.2 33.0 8.28 28 i 93 52 52 100 r p 3,725,28 26.2 33.0 8.28 28 i 93 52 52 100 r p 3,725,28 26.2 33.0 8.28 28 i 93 52 52 100 r p 3,725,28 26.5 33.8 8.6 8.21 28 28 i 93 52 568 A 0 o r n 4,725,29 28.5 38.6 8.21 28 28 1 99 6 570 100 c n 4,725,29 28.2 35.7 8.19 25 14 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 89      |        | 100 | r  |    | 3/23/29   |               |      |      |                                      | i       |
| 92 549 100   |         |        | 100 |    |    |           |               |      |      |                                      | i       |
| 92 549 100 oc p 3/25/29 26.2 36.0 8.28 28 i 93 552 0 r p 3/31/29 27.6 35.8 8.27 29 i 94 558 100 oc p 3/31/29 27.6 35.8 8.27 29 i 94 558 100 oc n 4/25/29 27.6 35.8 8.27 29 i 95 568 100 oc n 4/25/29 27.6 35.8 8.27 29 i 95 568 100 oc n 4/25/29 27.6 35.8 8.27 29 i 95 568 100 oc n 4/25/29 27.6 35.8 8.27 29 i 95 568 100 oc n 4/25/29 27.6 35.8 8.27 8.19 125 i 100 125 125 125 125 125 125 125 125 125 125   |         |        |     |    |    |           |               |      |      |                                      | i       |
| 93 552 0 r p 3/31/29 28.7 34.7 8.30 28 i 94 559 100 or n 4/22/29 28.5 35.6 8.21 255 i 94 559 100 or n 4/22/29 28.5 35.6 8.21 255 i 95 568  |         |        |     |    |    |           |               |      |      |                                      | 1       |
| 93 553 100   |         |        |     |    |    | 3/29/29   |               |      |      |                                      | i       |
| 94 559 100 r n 4/22/29 28.5 35.6 8.21 25 i 96 570 100 c n 4/25/29 (29.4 34.7 8.26 21) 25 i 96 570 100 oc n 4/25/29 28.2 35.7 8.19 25 i 97 576 100 oc n 4/26/29 28.2 35.7 8.19 25 i 98 7576 100 oc n 4/26/29 28.2 35.7 8.19 25 i 98 7576 100 r p 4/26/29 28.2 35.7 8.19 25 i 98 7576 100 r p 4/26/29 28.2 35.7 8.19 25 i 98 7576 100 r p 4/26/29 28.2 35.7 8.19 25 i 98 7576 100 r p 4/26/29 28.2 35.7 8.19 25 i 98 7576 100 r p 4/26/29 28.2 35.7 8.19 25 i 98 25 33 100 r p 4/26/29 26.7 35.3 8.16 24 42 42 42 42 42 42 42 42 42 42 42 42   | 93      |        |     |    |    |           | 27.6          | 35.8 | 8.27 |                                      | i       |
| 955 586A 0 oc n 4/28/28 (29.4 34.7 8.26 14) to 96 570 100 c n 4/28/28 28.2 35.7 8.19 25 to 96 573 100 oc p 4/28/28 28.2 35.7 8.19 25 to 97 576 100 oc n 4/28/28 27.6 35.6 8.15 25 to 97 576 100 oc n 4/28/28 27.6 35.6 8.15 25 to 98 35.7 8.19 25 to 98 35.8 to 98 35.3 100 r n n 4/30/28 27.6 35.6 8.15 25 to 98 35.3 100 r n n 4/30/28 27.7 35.3 8.16 22 to 99 35.5 5 to 0 c n p 4/30/28 27.7 35.3 8.16 22 to 99 35.8 588 100 r n p 4/30/28 26.9 35.3 8.16 28 to 98 35.8 588 100 r n p 4/30/28 26.9 35.3 8.16 28 to 98 35.8 586 50 oc n n 5/2/29 27.8 34.9 8.22 12 to 99 590 50 oc n 5/2/29 27.8 34.9 8.22 12 to 99 590 50 co n 5/2/29 27.8 34.9 8.22 12 to 101 605 597 100 r n p 5/2/29 27.8 34.9 8.22 12 to 101 605 100 co p 5/2/29 27.8 34.9 8.22 12 to 101 605 100 co n 5/4/29 27.6 34.7 8.22 12 to 101 605 100 co n 5/4/29 27.6 34.7 8.22 12 to 101 605 100 co n 5/4/29 27.6 34.7 8.22 12 to 101 607 50 oc p 5/7/29 25.6 34.7 8.22 12 to 101 608 100 co p 5/7/29 25.6 35.0 8.23 10 102 614 100 r p 5/7/29 25.6 35.0 8.23 8 to 102 614 100 r p 5/9/29 25.8 35.0 8.23 8 to 102 614 100 r p 5/9/29 25.8 35.0 8.23 8 to 104 628 100 oc p 5/7/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/7/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/7/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/7/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/7/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/7/29 25.6 35.1 8.23 5 io 107 644 100 r p 5/9/29 25.8 35.0 8.23 8 to 108 647 50 r p 5/9/29 25.8 35.0 8.23 4 to 108 647 50 r p 5/9/29 25.8 35.0 8.23 4 to 108 647 50 r p 5/9/29 25.8 35.0 8.23 5 io 106 638 100 r p 5/9/29 25.8 35.0 8.23 5 io 106 638 100 r p 5/9/29 25.8 35.0 8.23 5 io 106 638 100 r p 5/9/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/9/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/9/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/9/29 25.6 35.1 8.23 5 io 106 638 100 r p 9/9/29 25.6 35.1 8.23 5 io 106 638 100 r p 9/9/29 25.6 35.1 8.23 5 io 108 647 50 r p 9/9/29 25.6 35.1 8.34 6 8.25 5 5 io 110 668 100 0 c p 9/9/29 2 |         |        |     |    | 'n | 4/22/29   |               |      | 8.21 | 25                                   | ī       |
| 96 573 100 oc p 4/26/29 28.2 35.7 8.19 25 1 97 576 100 oc n 4/28/29 27.6 35.6 8.15 25 1 97 579 100 r p 4/28/29 27.6 35.6 8.15 25 1 98 579 100 r n p 4/28/29 27.6 35.6 8.15 25 1 98 581 0 r n 4/30/29 27.0 35.3 8.16 24 8.1 8 98 583 100 r n n 4/30/29 26.7 35.4 8.14 8.14 32 1 98 585 100 r n p 4/30/29 26.7 35.4 8.14 8.14 32 1 98 585 100 r p p 4/30/29 26.7 35.4 8.14 8.14 32 1 98 585 100 r p p 4/30/29 27.0 35.3 8.16 24 1 98 585 100 r p p 4/30/29 27.8 35.3 8.16 24 1 98 585 100 r p p 4/30/29 27.8 35.3 8.16 28 1 1 99 590 50 0c n p 5/2/29 27.8 34.9 8.22 12 2 1 2 1 99 590 50 0c n p 5/2/29 27.8 34.9 8.22 12 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 95      |        | 0   | oc | n  |           |               | 34.7 |      | 14)                                  | t       |
| 97 576 100   |         |        |     |    |    |           |               |      |      |                                      | t       |
| 98 581 00 r n 4/30/29 27.0 35.6 8.15 25 t  |         |        |     |    |    |           |               |      |      |                                      | t       |
| 98 581 00 r n 4/30/29 27.0 35.3 8.16 24 198 584 100 r n 4/30/29 26.7 35.4 8.14 32 198 584 00 oc p 4/30/29 26.7 35.4 8.14 32 198 585 550 r p 4/30/29 26.9 35.3 8.16 28 198 588 588 500 c n 5/2/29 27.8 34.9 8.22 12 12 199 590 50 oc n 5/2/29 27.8 34.9 8.22 12 12 199 590 50 oc n 5/2/29 27.8 34.9 8.22 12 12 199 594 100 oc p 5/2/29 27.8 34.9 8.22 12 10 100 597 100 r n 5/4/29 27.8 35.0 8.22 17 100 597 100 r n 5/4/29 27.8 35.0 8.22 17 100 605 100 oc p 5/4/29 27.8 35.0 8.22 12 101 605 100 oc p 5/4/29 27.6 34.7 8.22 12 101 606 607 50 oc p 5/7/29 26.2 35.1 8.23 8 16 102 613 50 oc p 5/7/29 25.2 35.1 8.23 8 16 102 613 50 oc p 5/9/29 25.8 35.0 8.24 8 100 606 638 100 oc p 5/17/29 25.6 35.0 8.23 10 104 605 100 oc p 5/17/29 25.6 35.0 8.23 10 106 638 100 oc p 5/17/29 25.6 35.1 8.23 8 16 100 606 638 100 oc p 5/17/29 25.6 35.1 8.23 10 106 638 100 oc p 5/17/29 25.6 35.1 8.23 10 106 638 100 oc p 5/17/29 27.7 27.2 35.0 8.23 10 107 643 50 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 25.6 35.1 8.23 10 107 643 100 oc p 5/17/29 26.8 35.0 8.23 11 107 643 100 oc p 5/17/29 26.8 35.0 8.23 11 107 643 100 oc p 5/17/29 26.8 35.0 8.23 10 107 643 100 oc p 5/17/29 27.2 27.9 34.4 8.23 15 107 644 100 oc p 5/17/29 27.2 28.8 34.9 8.23 11 107 643 100 0c n p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc p 5/19/29 27.9 34.4 8.23 15 107 643 100 665 100 oc n p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc n p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc n p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc n p 5/19/29 27.9 34.4 8.23 15 107 644 100 oc n p 5/19/29 27.9 34.4 8.23 15 100 658 100 oc n p 5/19/29 27.9 34.4 8.23 15 100 665 100 oc n p 5/19/29 27.9 34.4 8.23 15 100 665 100 oc n p 5/19/29 27.9 34.4 8.23 15 100 665 100 oc n p 5/19/29 27.2 34.8 8.33 35.0 8.23 17 100 100  |         |        |     |    |    |           |               |      |      | 25                                   | t       |
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| 101  |         |        |     |    |    |           |               |      | 8 22 |                                      | t t     |
| 101   608   100   0c   |         |        |     |    |    |           |               |      |      |                                      | t       |
| 102 612 0 r p 5 / 9/29 25.8 35.0 8.24 8 t 102 614 100 r p 5 / 9/29 25.6 35.0 8.24 8 t 102 614 100 r p 5 / 9/29 25.6 35.0 8.24 8 t 104 626 100 oc p 5 / 13/29 25.3 35.3 8.21 7 i 106 635 100 oc p 5 / 13/29 25.3 35.3 8.21 7 i 106 638 0 oc p 5 / 13/29 27.2 35.0 8.23 5 i 106 638 100 r p 5 / 17/29 27.2 35.0 8.23 5 i 107 641 100 r n 5 / 19/29 26.8 34.9 8.23 11 i 107 644 100 oc p 5 / 19/29 26.8 34.9 8.23 11 i 107 644 100 oc p 5 / 19/29 26.8 34.9 8.23 11 i 108 647 50 r n 5 / 19/29 26.8 34.9 8.23 4 i 109 656 100 oc n 5 / 19/29 26.8 34.9 8.23 4 i 109 658 50 r p 5 / 19/29 26.8 34.9 8.23 11 i 109 658 50 r p 5 / 19/29 26.8 34.9 8.23 11 i 110 663 100 r n 5 / 13/29 19.4 34.8 8.18 5 i 110 665 50 r p 5 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 5 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 5 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 6 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 6 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 6 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 6 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 6 / 13/29 19.4 34.8 8.18 5 i 110 665 100 oc n 6 / 13/29 19.4 34.7 8.14 11 i 112 678 50 r p 6 / 5/29 21.7 34.6 8.23 7 i 113 680 0 r n 6 / 25/29 21.7 34.6 8.23 7 i 113 681 50 oc n 6 / 25/29 21.7 34.6 8.23 5 i 113 683 0 r p 6 / 5/29 12.1 34.7 8.20 8 i 113 684 50 r p 6 / 5/29 12.1 34.7 8.23 8 i 128 778 100 oc n 6 / 25/29 21.5 34.7 8.23 8 i 130 685 100 oc n 6 / 25/29 21.5 34.7 8.23 8 i 131 789 100 oc n 9 / 14/29 18.7 34.8 8.34 6 i 132 779 100 r n 9 / 14/29 18.7 34.8 8.34 6 i 134 810 100 oc n 9 / 14/29 18.7 34.8 8.34 6 i 135 822 100 r n 9 / 14/29 18.7 34.8 8.34 6 i 136 834 100 oc n 9 / 14/29 18.7 34.8 8.34 5 i 137 888 100 oc n 9 / 14/29 18.7 34.8 8.34 5 i 138 848 50 r p 9 / 14/29 18.7 34.8 8.31 3 i 138 848 50 r p 9 / 14/29 18.7 34.8 8.31 3 i 139 855 100 oc n 9 / 12/29 22.2 34 35.0 8.34 7 t 140 685 100 oc n 9 / 12/29 18.1 34.8 8.34 7 t 140 685 100 oc n 9 / 12/29 18.1 34.8 8.34 7 t 140 685 100 oc n 9 / 12/29 18.1 34.8 8.34 7 t 140 685 100 oc n 9 / 12/29 18.8 35.0 8.37 5 i 139 855 100 oc n 9 / 12/29 25.5 35.0 34.7 7 t 140 855  |         |        |     |    | D  | 5/ 7/29   |               |      |      |                                      | t       |
| 102 613 50 oc p 5/9/29 25.6 35.0 8.24 8 to 104 626 100 oc p 5/13/29 25.6 35.0 8.23 8 to 104 626 100 oc p 5/13/29 25.3 35.3 8.21 7 to 106 636 0 oc p 5/17/29 25.6 35.1 8.23 5 io 106 638 100 r p 5/17/29 27.2 35.0 8.23 5 io 106 638 100 r p 5/17/29 27.2 35.0 8.23 5 io 107 641 100 r n 5/19/29 25.6 35.1 8.23 5 io 107 641 100 r n 5/19/29 26.8 34.9 8.23 11 io 107 643 50 r p 5/19/29 26.8 34.9 8.23 11 io 107 644 100 oc p 5/19/29 26.8 34.9 8.23 11 io 107 644 100 oc p 5/19/29 26.8 34.9 8.23 4 io 108 647 50 r n 5/27/29 26.8 35.0 8.24 4 io 109 656 100 oc n 5/29/29 23.1 35.0 8.22 3 io 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 io 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 io 100 663 100 r n 5/29/29 19.4 34.8 8.18 5 io 110 663 100 r n 5/31/29 17.9 34.7 8.14 11 io 110 665 50 r p 5/31/29 17.9 34.7 8.14 11 io 110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 io 110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 io 112 676 100 r n 6/5/29 17.9 34.7 8.14 11 io 112 676 100 r n 6/5/29 20.8 34.9 8.23 5 io 113 680 0 r n 6/25/29 24.2 34.5 8.25 5 io 113 680 0 r n 6/25/29 23.8 34.6 8.25 5 io 113 683 0 r p 6/25/29 21.5 34.7 8.23 8 io 113 683 0 r p 6/25/29 21.5 34.7 8.23 8 io 113 683 0 r p 6/25/29 21.5 34.7 8.23 8 io 113 683 100 c n 9/4/29 8.8 33.7 8.06 176 io 134 817 100 oc n 9/4/29 8.8 33.7 8.06 176 io 134 817 100 oc n 9/4/29 8.8 33.7 8.06 176 io 134 817 100 oc n 9/4/29 8.8 33.7 8.06 176 io 134 817 100 oc n 9/4/29 8.8 33.7 8.06 176 io 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 io 136 829 100 oc n 9/4/29 8.8 33.7 8.06 176 io 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 io 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 io 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 io 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 io 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 io 136 829 100 oc n 9/14/29 18.6 35.0 8.37 5 io 136 824 100 oc n 9/14/29 18.6 35.0 8.37 5 io 136 824 100 oc n 9/14/29 18.6 35.0 8.37 5 io 136 824 100 oc n 9/14/29 18.6 35.0 8.37 5 io 136 824 100 oc n 9/14/29 18.6 35.0 8.39 3 io 137 838 100 oc n 9/14/29 18.6 35.0 8.37 5 io 136 824 100 oc n 9/14/29 18.6 35.0 8.34 7 to 136 824 10 |         |        |     |    | q  | 5/ 9/29   | 25.8          |      | 8.24 | 8                                    | t       |
| 102 614 100 r p 5 /9 /29 25.6 35.0 8.23 8 t 1 104 626 100 oc p 5 /13 /29 25.3 35.3 8.21 7 i 106 635 100 oc n 5 /17 /29 25.6 35.1 8.23 5 i 106 638 100 r p 5 /17 /29 25.6 35.1 8.23 5 i 106 638 100 r p 5 /17 /29 25.6 35.1 8.23 5 i 107 641 100 r n 5 /19 /29 25.6 35.1 8.23 5 i 107 641 100 r n 5 /19 /29 26.8 34.9 8.23 11 i 107 644 100 oc p 5 /19 /29 26.8 34.9 8.23 11 i 107 644 100 oc p 5 /19 /29 26.8 34.9 8.23 4 i 109 656 100 oc n 5 /29 /29 19.4 34.8 8.18 5 1 109 656 100 oc n 5 /29 /29 19.4 34.8 8.18 5 1 100 663 100 r p 5 /31 /29 19.4 34.8 8.18 5 1 110 663 100 r n 5 /31 /29 17.9 34.7 8.14 11 11 666 100 oc p 5 /31 /29 17.9 34.7 8.14 11 11 666 100 oc p 5 /31 /29 17.9 34.7 8.14 11 11 666 100 oc p 5 /31 /29 17.9 34.7 8.14 11 11 2 676 100 oc n 6 /25 /29 21.7 34.6 8.23 7 113 680 0 r p 6 /5 /29 21.7 34.6 8.23 7 113 681 50 oc n 6 /25 /29 21.7 34.6 8.23 7 113 683 0 r p 6 /5 /29 22 3.8 34.6 8.25 5 1 113 683 50 r p 6 /5 /29 21.7 34.6 8.25 5 1 113 684 50 r p 6 /25 /29 21.7 34.6 8.25 5 1 113 683 100 r p 6 /25 /29 21.7 34.6 8.25 5 1 113 684 50 r p 6 /25 /29 21.7 34.6 8.25 5 1 113 683 50 r p 6 /25 /29 21.7 34.6 8.25 5 1 113 684 50 r p 6 /25 /29 21.5 34.7 8.23 8 1 130 789 100 oc n 6 /25 /29 23.8 34.6 8.25 5 1 133 685 100 oc n 6 /25 /29 23.8 34.6 8.25 5 1 133 685 100 oc n 6 /25 /29 23.8 34.6 8.25 5 1 134 887 100 oc n 6 /25 /29 23.8 34.6 8.25 5 1 134 887 100 oc n 6 /25 /29 23.8 34.6 8.25 5 5 1 134 887 100 oc n 9 /4 /29 8.8 33.7 8.06 176 i 134 817 100 oc n 9 /12 /29 18.1 34.6 8.34 6 i 134 817 100 oc n 9 /12 /29 18.1 34.6 8.34 6 i 134 817 100 oc n 9 /12 /29 18.1 34.6 8.34 6 i 135 822 100 r n 9 /14 /29 18.7 34.8 8.34 5 i 136 829 100 oc n 9 /12 /29 18.1 34.6 8.34 6 i 134 817 100 oc n 9 /14 /29 18.7 34.8 8.34 5 i 136 824 100 oc n 9 /14 /29 18.7 34.8 8.34 5 i 136 824 100 oc n 9 /14 /29 18.1 34.8 8.34 5 i 136 824 100 oc n 9 /14 /29 18.7 34.8 8.34 6 i 134 817 100 oc n 9 /14 /29 18.6 33.7 35.0 8.37 5 i 135 826 100 oc n 9 /14 /29 18.6 33.0 33.0 33.0 33.0 33.0 33.0 33.0 33   |         |        |     | oc | p  | 5/ 9/29   |               |      |      |                                      | t       |
| 106         635         100         oc         n         5/17/29         25.6         35.1         8.23         5         i           106         636         0         oc         p         5/17/29         27.2         35.0         8.23         5         i           107         641         100         r         n         5/19/29         28.8         34.9         8.23         11         i           107         644         100         oc         p         5/19/29         26.8         34.9         8.23         4         i           108         647         50         r         n         5/27/29         26.8         34.9         8.23         4         i           109         656         100         oc         n         5/29/29         19.4         34.8         8.18         5         .           109         659         100         r         p         5/29/29         19.4         34.8         8.18         5         i           110         663         100         r         n         5/29/29         19.4         34.8         8.14         11         1         1         1         1   |         |        |     |    | р  |           |               |      |      |                                      | t t     |
| 106         638         0         oc         p         5/17/29         27.2         35.0         8.23         5         i           106         638         100         r         p         5/17/29         25.6         35.1         8.23         5         i           107         643         50         r         p         5/19/29         27.9         34.4         8.23         4         i           107         644         100         oc         p         5/19/29         27.9         34.4         8.23         4         i           108         647         50         r         n         5/27/29         26.8         34.9         8.23         4         i           109         656         100         oc         n         5/29/29         23.1         35.0         8.22         3           109         658         50         r         p         5/29/29         23.1         35.0         8.22         3           109         659         100         r         n         5/31/29         19.4         34.8         8.18         5         1           110         665         50         r   |         |        |     |    | p  | 5/13/29   |               |      |      |                                      |         |
| 106         638         100         r         p         5/17/29         25.6         35.1         8.23         5         i           107         641         100         r         n         5/19/29         26.8         34.9         8.23         11         i           107         644         100         oc         p         5/19/29         26.8         34.9         8.23         4         i           109         656         100         oc         n         5/29/29         29.1         34.4         8.23         4         i           109         656         100         oc         n         5/29/29         19.4         34.8         8.18         5         .           109         659         100         r         p         5/29/29         19.4         34.8         8.18         5         .           110         663         100         r         n         5/31/29         17.9         34.7         8.14         11         i           110         666         100         oc         p         5/31/29         17.9         34.7         8.14         11         i         11         11         11<   |         |        |     |    |    | 5/17/29   |               |      |      |                                      |         |
| 107 641 100 r n 5/19/29 26.8 34.9 8.23 11 ii 107 643 50 r p p 5/19/29 27.9 34.4 8.23 4 ii 107 644 100 oc p 5/19/29 26.8 34.9 8.23 4 ii 108 647 50 r n 5/27/29 26.8 35.0 8.24 4 ii 109 656 100 oc n 5/29/29 19.4 34.8 8.18 5 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 109 659 100 r p 5/31/29 17.9 34.7 8.14 11 ii 110 665 50 r p 5/31/29 17.9 34.7 8.14 11 ii 110 665 50 r p 5/31/29 17.9 34.7 8.14 11 ii 110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 ii 112 676 100 r n 6/5/29 19.8 34.7 8.20 8 ii 112 676 50 r p 6/5/29 21.7 34.6 8.23 7 113 680 0 r p 6/25/29 24.2 34.5 8.25 5 ii 113 681 50 oc n 6/25/29 21.7 34.6 8.23 7 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 ii 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 ii 113 684 50 r p 6/25/29 24.2 34.5 8.25 5 ii 113 684 50 r p 6/25/29 24.2 34.5 8.25 5 ii 113 684 50 r p 6/25/29 24.2 33.8 34.6 8.25 5 ii 113 685 100 oc n 6/25/29 21.5 34.7 8.23 8 ii 128 778 100 r p 7/25/29 10.2 33.2 8.06 46 ii 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 ii 131 789 100 oc n 9/4/29 8.8 33.7 5 ii 134 817 100 oc n 9/4/29 18.1 34.6 8.34 6 ii 134 817 100 oc n 9/4/29 18.7 34.8 8.34 5 ii 135 821 50 r n 9/14/29 18.7 34.8 8.34 5 ii 136 829 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 137 881 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 138 825 50 r p 9/12/29 18.1 34.6 8.34 6 ii 139 851 100 oc n 9/16/29 12.5 35.0 8.37 5 ii 136 829 100 oc n 9/16/29 18.7 34.8 8.34 5 ii 137 884 50 o r p 9/14/29 21.5 35.0 8.37 5 ii 138 845 100 r n 9/16/29 18.6 35.0 8.39 3 ii 139 851 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 139 851 100 oc n 9/16/29 22.2 34.8 8.31 3 ii 139 851 100 oc n 9/16/29 22.2 34.8 8.31 3 ii 139 855 100 oc n 9/16/29 22.2 34.8 8.31 3 ii 139 855 100 oc n 9/16/29 22.2 34.3 52.2 8.28 6 ii 139 855 100 oc n 9/16/29 22.4 35.2 8.28 6 ii 139 855 100 oc n 9/16/29 22.4 35.2 8.28 6 ii 139 855 100 oc n 9/16/29 22.4 35.2 8.28 6 ii 140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   |         |        |     |    |    |           |               |      | 8.23 |                                      |         |
| 107 643 50 r p 5/19/29 27.9 34.4 8.23 4 i 1 107 644 100 oc p 5/19/29 26.8 34.9 8.23 4 i 1 108 647 50 r n 5/27/29 26.8 35.0 8.24 4 i 1 109 656 100 oc n 5/29/29 19.4 34.8 8.18 5  |         |        |     |    | n  |           |               |      | 8.23 |                                      |         |
| 107 644 100 oc p 5/19/29 26.8 34.9 8.23 4 i   108 647 50 r n 5/27/29 26.8 35.0 8.24 4 i   109 656 100 oc n 5/29/29 19.4 34.8 8.18 5 .   109 658 50 r p 5/29/29 19.4 34.8 8.18 5 .   109 659 100 r p 5/29/29 19.4 34.8 8.18 5 .   110 663 100 r n 5/31/29 17.9 34.7 8.14 11 i   110 666 50 r p 5/31/29 17.9 34.7 8.14 11 i   110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 i   112 676 100 r n 6/5/29 19.8 34.7 8.14 11 i   112 678 50 r p 6/5/29 21.7 34.6 8.23 7 .   113 680 0 r n 6/5/29 24.2 34.5 8.25 5 i   113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 i   113 683 0 r p 6/25/29 21.5 34.7 8.23 8 i   113 683 0 r p 6/25/29 21.5 34.7 8.23 8 i   113 683 0 r p 6/25/29 21.5 34.7 8.23 8 i   113 685 100 oc n 6/25/29 21.5 34.7 8.23 8 i   113 685 100 oc n 9/4/29 11.5 34.7 8.23 8 i   128 778 100 r p 6/25/29 21.5 34.7 8.23 8 i   128 778 100 r p 7/25/29 10.2 33.2 8.06 46    131 789 100 oc n 9/4/29 8.8 33.7 8.06 176 i   131 789 100 oc n 9/14/29 18.1 33.4 8.32   133 789 100 oc n 9/4/29 8.8 33.7 8.06 176 i   134 817 100 oc p 9/12/29 18.1 34.6 8.34 6 i   135 825 50 r p 9/14/29 18.1 34.6 8.34 6 i   136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 i   136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 i   136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 i   136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 i   137 838 100 oc n 9/14/29 18.7 34.8 8.34 5 i   138 845 100 r n 9/14/29 18.7 34.8 8.34 5 i   139 851 100 oc n 9/16/29 18.6 35.0 8.37 5 i   139 855 100 oc n 9/16/29 25.5 35.0 8.34 7 t   140 858 100 r n 9/22/29 22.4 35.2 8.28 6    140 858 100 r n 9/22/29 22.4 35.2 8.28 6    140 858 100 r n 9/22/29 22.4 35.2 8.28 6    140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   140 858 100 r n 10/3/     |         |        |     |    |    |           |               |      |      |                                      |         |
| 108       647       50       r       n       5/27/29       26.8       35.0       8.24       4       i         109       658       50       r       p       5/29/29       19.4       34.8       8.18       5       .         109       659       100       r       p       5/29/29       19.4       34.8       8.18       5       .         110       665       100       r       n       5/31/29       17.9       34.7       8.14       11       i         110       665       50       r       p       5/31/29       17.9       34.7       8.14       11       i         110       666       100       oc       p       5/31/29       17.9       34.7       8.14       11       i         110       666       100       oc       p       5/31/29       17.9       34.7       8.14       11       i         112       676       100       r       n       6/5/29       21.7       34.6       8.23       7       .         113       681       50       r       p       6/25/29       21.5       34.7       8.23       8       i  |         |        |     |    |    | 5/19/29   |               |      |      | 4                                    | i       |
| 109 658 50 r p 5/29/29 23.1 35.0 8.22 3 1109 659 100 r p 5/29/29 19.4 34.8 8.18 5 1110 663 100 r n n 5/31/29 17.9 34.7 8.14 11 11 110 665 50 r p 5/31/29 18.4 34.8 8.16 7 if 110 666 100 oc p 5/31/29 18.4 34.8 8.16 7 if 110 666 100 r n n 6/5/29 19.8 34.7 8.14 11 11 112 676 100 r n n 6/5/29 19.8 34.7 8.14 11 11 112 676 100 r n n 6/5/29 21.7 34.6 8.23 7 113 680 0 r n n 6/25/29 21.7 34.6 8.23 7 113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 if 113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 if 113 682 100 oc n 6/25/29 21.5 34.7 8.23 8 if 113 683 0 r p 6/25/29 21.5 34.7 8.23 8 if 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 if 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 if 113 685 100 oc n 6/25/29 23.8 34.6 8.25 5 if 113 685 100 oc n 9/6/25/29 23.8 34.6 8.25 5 if 113 685 100 oc n 9/6/25/29 23.8 34.6 8.25 5 if 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 if 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 if 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 if 113 685 100 oc n 9/6/25/29 21.5 34.7 8.23 8 if 128 778 100 r n p 9/25/29 10.2 33.2 8.06 46 if 134 810 100 oc n 9/4/29 8.8 33.7 8.06 176 if 131 789 100 oc n 9/4/29 8.8 33.7 8.06 176 if 134 810 100 oc n 9/4/29 18.1 33.4 8.32 if 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 if 134 817 100 oc n 9/14/29 18.7 34.8 8.34 5 if 135 825 50 r n 9/14/29 18.7 34.8 8.34 5 if 135 825 100 oc n 9/14/29 18.7 34.8 8.34 5 if 135 825 100 oc n 9/14/29 18.7 34.8 8.34 5 if 135 826 100 r n 9/14/29 18.7 34.8 8.34 5 if 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 if 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 if 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 if 136 829 100 oc n 9/14/29 21.5 35.0 8.39 3 if 137 838 100 oc n 9/14/29 21.5 35.0 8.39 3 if 137 838 100 oc n 9/14/29 22.5 34.8 8.31 3 if 138 845 100 r n 9/14/29 22.5 34.8 8.31 3 if 139 855 100 oc n 9/12/29 22.4 35.2 8.28 6 if 139 855 100 oc n 9/12/29 22.4 35.2 8.28 6 if 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 if 140 858 100 r n 10/3/29 25.5 35.0 8.34 7 te  |         |        |     |    |    |           |               |      |      |                                      | i       |
| 109 659 100 r p 5/29/29 19.4 34.8 8.18 5 in 110 663 100 r n 5/31/29 17.9 34.7 8.14 11 in 110 665 50 r p 5/31/29 17.9 34.7 8.14 11 in 110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 in 1112 676 100 r n 6/5/29 19.8 34.7 8.14 11 in 1112 676 100 r n 6/5/29 19.8 34.7 8.14 11 in 1112 676 100 r n 6/5/29 21.7 34.6 8.20 8 in 112 678 50 r p 6/5/29 21.7 34.6 8.23 7 in 113 680 0 r n 6/25/29 24.2 34.5 8.25 5 in 113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 in 113 683 0 r p 6/25/29 23.8 34.6 8.25 5 in 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 in 113 684 50 r p 6/25/29 24.2 34.5 8.25 5 in 113 684 50 r p 6/25/29 24.2 34.5 8.25 5 in 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 in 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 in 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 in 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 in 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 in 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 in 113 684 50 r n p 6/25/29 23.8 34.6 8.25 5 in 113 685 100 oc p 6/25/29 10.2 33.2 8.06 46 in 130 783 100 c n p 9/6/25/29 10.2 33.2 8.06 46 in 130 783 100 c n p 9/6/29 12.1 33.4 8.03 16 in 134 810 100 oc n p 9/6/29 12.1 33.4 8.30 16 in 134 810 100 oc n p 9/6/29 12.1 33.4 8.30 16 in 134 810 100 oc n p 9/8/29 14.3 33.4 8.30 16 in 134 810 100 oc n p 9/12/29 18.1 34.6 8.34 6 in 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 in 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 in 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 in 135 825 50 r p 9/14/29 18.7 34.8 8.34 5 in 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 in 135 826 100 r n 9/14/29 18.7 34.8 8.34 5 in 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 in 136 824 100 oc n 9/16/29 18.6 35.0 8.39 3 in 136 825 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/16/29 22.2 34.8 8.31 3 in 138 845 100 oc n 9/22/29 22.4 35.2 8.28 6 in 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 in 139 855 100 oc n 9/22/29 22.4 35.2  |         |        |     |    |    |           |               |      |      |                                      | **      |
| 110 663 100 r p 5/31/29 17.9 34.7 8.14 11 11 10 665 50 r p 5/31/29 18.4 34.8 8.16 7 110 666 100 oc p 5/31/29 18.4 34.8 8.16 7 1110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 11 11 11 11 11 11 11 11 11 11 11 1   |         |        |     |    |    |           |               |      |      |                                      | **      |
| 110 665 50 r p 5/31/29 18.4 34.8 8.16 7 ii 110 666 100 r n 6/5/29 17.9 34.7 8.14 11 ii 112 676 100 r n 6/5/29 19.8 34.7 8.20 8 ii 112 678 50 r p 6/5/29 21.7 34.6 8.23 7 . 113 680 0 r n 6/25/29 24.2 34.5 8.25 5 ii 113 681 50 oc n 6/25/29 23.8 34.7 8.23 8 ii 113 682 100 oc n 6/25/29 24.2 34.5 8.25 5 ii 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 ii 113 684 50 r p 6/25/29 24.2 34.5 8.25 5 ii 113 685 100 oc n 6/25/29 24.2 34.5 8.25 5 ii 113 685 100 oc n 6/25/29 24.2 34.5 8.25 5 ii 113 685 100 oc n 6/25/29 24.2 34.5 8.25 5 ii 113 685 100 oc n 9/25/29 23.8 34.7 8.23 8 ii 128 778 100 r p 6/25/29 21.5 34.7 8.23 8 ii 130 783 100 c n 9/4/29 10.2 33.2 8.06 46 ii 131 789 100 oc n 9/4/29 8.8 33.7 8.06 176 ii 131 789 100 oc n 9/4/29 8.8 33.7 8.06 176 ii 131 789 100 oc n 9/4/29 8.8 33.7 8.06 176 ii 132 799 100 r n 9/8/29 14.3 33.4 8.32 ii 133 789 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 ii 135 825 50 r n 9/14/29 18.7 34.8 8.34 5 ii 135 825 50 r n 9/14/29 18.7 34.8 8.34 5 ii 136 829 100 oc n 9/18/29 18.7 34.8 8.34 5 ii 137 838 100 oc n 9/18/29 18.7 34.8 8.34 5 ii 138 845 100 r n 9/18/29 18.6 35.0 8.39 3 ii 138 845 100 r n 9/18/29 21.5 35.0 8.39 3 ii 138 845 100 r n 9/18/29 22.2 34.8 8.31 3 ii 138 845 100 r n 9/20/29 22.2 34.8 8.31 3 ii 139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 r n 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 r n 10/3/29 25.5 35.0 8.34 7  |         |        |     |    |    |           |               |      |      |                                      |         |
| 110 666 100 oc p 5/31/29 17.9 34.7 8.14 11 1 112 676 100 r n 6/5/29 19.8 34.7 8.20 8 i 112 678 50 r p 6/5/29 21.7 34.6 8.23 7 113 680 0 r n 6/25/29 24.2 34.5 8.25 5 i 113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 i 113 682 100 oc n 6/25/29 21.5 34.7 8.23 8 i 113 683 0 r p 6/25/29 21.5 34.7 8.23 8 i 113 684 50 r p 6/25/29 21.5 34.7 8.23 8 i 113 685 100 oc p 6/25/29 21.5 34.7 8.23 8 i 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 i 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 i 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 i 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 i 113 685 100 oc p 6/25/29 23.8 34.6 8.25 5 i 113 685 100 oc p 6/25/29 21.5 33.7 8.06 46 i 130 783 100 c n 9/4/29 8.8 33.7 8.06 46 i 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 i 131 789 100 oc n 9/6/29 12.1 33.4 8.32 i 132 799 100 r n 9/8/29 12.1 33.4 8.32 i 132 799 100 r n 9/12/29 18.1 34.6 8.34 6 i 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 i 135 825 100 r n 9/14/29 18.7 34.8 8.34 5 i 136 821 50 r n 9/14/29 18.7 34.8 8.34 5 i 135 825 100 r p 9/14/29 18.7 34.8 8.34 5 i 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 i 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 i 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 i 138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i 138 845 100 oc n 9/18/29 21.5 35.1 8.30 5 i 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i 140 858 100 r n 10/3/29 25.5 35.0 8.34 7   |         |        |     |    |    |           |               |      |      |                                      |         |
| 112       676       100       r       n       6/5/29       19.8       34.7       8.20       8       i         112       678       50       r       p       6/5/29       21.7       34.6       8.23       7       .         113       680       0       r       n       6/25/29       24.2       34.5       8.25       5       i         113       681       50       oc       n       6/25/29       23.8       34.6       8.25       5       i         113       682       100       oc       n       6/25/29       21.5       34.7       8.23       8       i         113       683       0       r       p       6/25/29       23.8       34.6       8.25       5       i         113       684       50       r       p       6/25/29       23.8       34.7       8.23       8       i         113       685       100       r       p       6/25/29       21.5       34.7       8.23       8       i         128       778       100       r       p       7/25/29       10.5       34.7       8.23       8       i <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11</td> <td></td>  |         |        |     |    |    |           |               |      |      | 11                                   |         |
| 112       678       50       r       p       6/5/29       21.7       34.6       8.23       7       .         113       680       0       r       n       6/25/29       24.2       34.5       8.25       5       i         113       681       50       oc       n       6/25/29       23.8       34.6       8.25       5       i         113       682       100       oc       n       6/25/29       21.5       34.7       8.23       8       i         113       684       50       r       p       6/25/29       23.8       34.6       8.25       5       i         113       685       100       oc       p       6/25/29       23.8       34.6       8.25       5       i         113       685       100       oc       p       6/25/29       21.5       34.7       8.23       8       i         128       778       100       oc       n       9/4/29       18.3       34.6       8.25       5       i         131       789       100       oc       n       9/4/29       18.3       33.7       8.06       176       i   | 112     | 676    | 100 |    |    | 6/ 5/29   | 19.8          | 34.7 |      |                                      | i       |
| 113 681 50 oc n 6/25/29 23.8 34.6 8.25 5 ii 113 682 100 oc n 6/25/29 21.5 34.7 8.23 8 ii 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 ii 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 ii 113 685 100 oc p 6/25/29 21.5 34.7 8.23 8 ii 128 778 100 r p 7/25/29 10.2 33.2 8.06 46 ii 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 ii 131 789 100 oc n 9/4/29 8.8 33.7 8.06 176 ii 132 799 100 r n 9/8/29 12.1 33.4 8.32 ii 132 799 100 oc n 9/12/29 18.1 33.4 8.32 ii 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 ii 135 822 100 r n 9/14/29 21.5 35.0 8.37 5 ii 135 825 50 r p 9/14/29 21.5 35.0 8.37 5 ii 135 826 100 r n 9/14/29 18.7 34.8 8.34 5 ii 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 138 848 50 r p 9/16/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 25.6 34.7 8.30 3 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 140 858 100 r n 10/3/29 25.5 35.0 8.34 7  | 112     | 678    |     |    | p  |           |               |      |      |                                      | :*      |
| 113 682 100 oc n 6/25/29 21.5 34.7 8.23 8 1 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 ii 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 ii 113 685 100 oc p 6/25/29 21.5 34.7 8.23 8 ii 128 778 100 r p 7/25/29 10.2 33.2 8.06 46 ii 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 ii 131 789 100 oc n 9/6/29 12.1 33.4 8.32 ii 132 799 100 r n 9/8/29 12.1 33.4 8.30 16 ii 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 134 817 100 oc p 9/12/29 18.1 34.6 8.34 6 ii 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 ii 135 822 100 r n 9/14/29 21.5 35.0 8.37 5 ii 135 825 50 r p 9/14/29 18.7 34.8 8.34 5 ii 136 829 100 oc n 9/14/29 18.7 34.8 8.34 5 ii 137 838 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 136 829 100 oc n 9/16/29 18.7 34.8 8.34 5 ii 137 838 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 138 845 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 138 845 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 138 848 50 r p 9/14/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/16/29 18.6 35.0 8.39 3 ii 138 848 50 r p 9/18/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 140 858 100 r n 10/3/29 25.5 35.0 8.34 7  |         |        |     |    |    |           |               |      |      |                                      |         |
| 113 683 0 r p 6/25/29 24.2 34.5 8.25 5 in 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 in 113 685 100 oc p 6/25/29 21.5 34.7 8.23 8 in 128 778 100 r p 7/25/29 10.2 33.2 8.06 46 in 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 in 131 789 100 oc n 9/6/29 12.1 33.4 8.32 in 132 799 100 r n 9/6/29 12.1 33.4 8.32 in 132 799 100 oc n 9/12/29 18.1 34.6 8.34 6 in 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 in 134 817 100 oc p 9/12/29 18.1 34.6 8.34 6 in 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 in 135 822 100 r n 9/14/29 21.5 35.0 8.37 5 in 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 in 135 825 50 r p 9/14/29 18.7 34.8 8.34 5 in 135 826 100 r p 9/14/29 18.7 34.8 8.34 5 in 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 in 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 in 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 in 136 834 100 oc n 9/16/29 18.6 35.0 8.39 3 in 136 834 100 oc n 9/16/29 18.6 35.0 8.39 3 in 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 in 138 845 100 r n 9/20/29 22.2 34.8 8.31 3 in 138 848 50 r p 9/20/29 22.2 34.8 8.34 7 in 10/3/29 25.5 35.0 8.34 7  |         |        |     |    |    | 6/25/29   |               |      |      |                                      | 1       |
| 113 684 50 r p 6/25/29 23.8 34.6 8.25 5 ii 113 685 100 oc p 6/25/29 21.5 34.7 8.23 8 ii 128 778 100 r p 7/25/29 10.2 33.2 8.06 46 ii 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 ii 131 789 100 oc n 9/6/29 12.1 33.4 8.32 ii 132 799 100 r n 9/8/29 14.3 33.4 8.30 16 ii 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 ii 134 817 100 oc p 9/12/29 18.1 34.6 8.34 6 ii 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 ii 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 ii 135 825 50 r p 9/14/29 18.7 34.8 8.34 5 ii 135 826 100 r p 9/12/29 18.7 34.8 8.34 5 ii 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 ii 137 838 100 oc n 9/16/29 18.6 35.0 8.39 3 ii 138 848 50 r p 9/16/29 18.6 35.0 8.39 3 ii 138 848 50 r p 9/16/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/16/29 22.2 34.8 8.31 3 ii 138 848 50 r p 9/20/29 25.6 34.7 8.30 3 ii 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 ii 140 858 100 r n 10/3/29 25.5 35.0 8.34 7  |         |        |     |    |    | 6/25/29   | 24.2          |      |      | 5                                    | i       |
| 113 685 100 oc p 6/25/29 21.5 34.7 8.23 8 i 128 778 100 r p 7/25/29 10.2 33.2 8.06 46 i 130 783 100 c n 9/4/29 8.8 33.7 8.06 176 i 131 789 100 oc n 9/6/29 12.1 33.4 8.32 i 132 799 100 r n 9/8/29 14.3 33.4 8.30 16 i 134 810 100 oc n 9/12/29 18.1 34.6 8.34 6 i 134 817 100 oc p 9/12/29 18.1 34.6 8.34 6 i 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 i 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 i 135 822 100 r n 9/14/29 18.7 34.8 8.34 5 i 135 825 50 r p 9/14/29 18.7 34.8 8.34 5 i 135 826 100 r p 9/14/29 18.7 34.8 8.34 5 i 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 i 136 829 100 oc n 9/16/29 18.6 35.0 8.37 5 i 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 i 136 834 100 oc n 9/16/29 18.6 35.0 8.39 3 i 136 834 100 oc n 9/16/29 18.6 35.0 8.39 3 i 137 838 100 oc n 9/18/29 21.5 35.1 8.30 5 i 138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i 138 845 100 oc n 9/18/29 21.5 35.1 8.30 5 i 138 848 50 r p 9/20/29 22.2 34.8 8.31 3 i 138 845 100 oc n 9/22/29 22.4 35.2 8.28 6 i 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 i 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 i 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 i 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 i 139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 i 140 858 100 r n 10/3/29 25.5 35.0 8.34 7  | 113     |        |     |    |    | 6/25/29   |               |      | 8.25 | 5                                    |         |
| 128       778       100       r       p       7/25/29       10.2       33.2       8.06       46       i         130       783       100       c       n       9/4/29       8.8       33.7       8.06       176       i         131       789       100       oc       n       9/6/29       12.1       33.4       8.32        i         132       799       100       r       n       9/8/29       14.3       33.4       8.30       16       i         134       810       100       oc       n       9/12/29       18.1       34.6       8.34       6       i         135       821       50       r       n       9/14/29       21.5       35.0       8.37       5       i         135       822       100       r       n       9/14/29       21.5       35.0       8.37       5       i         135       825       50       r       p       9/14/29       18.7       34.8       8.34       5       i         136       829       100       oc       n       9/16/29       18.6       35.0       8.39       3       i <td>113</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>8</td> <td></td>   | 113     |        |     |    |    |           |               |      |      | 8                                    |         |
| 130       783       100       c       n       9/4/29       8.8       33.7       8.06       176       i         131       789       100       oc       n       9/6/29       12.1       33.4       8.32        i         132       799       100       r       n       9/8/29       14.3       33.4       8.30       16       i         134       810       100       oc       n       9/12/29       18.1       34.6       8.34       6       i         135       821       50       r       n       9/14/29       21.5       35.0       8.37       5       i         135       822       100       r       n       9/14/29       21.5       35.0       8.37       5       i         135       825       50       r       p       9/14/29       18.7       34.8       8.34       5       i         136       829       100       oc       n       9/16/29       18.6       35.0       8.39       3       i         136       829       100       oc       n       9/16/29       18.6       35.0       8.39       3       i <td>128</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>10.2</td> <td>33.2</td> <td>8.06</td> <td>46</td> <td>i</td>   | 128     |        |     |    |    |           | 10.2          | 33.2 | 8.06 | 46                                   | i       |
| 131       789       100       oc       n       9/6/29       12.1       33.4       8.32        i         132       799       100       r       n       9/8/29       14.3       33.4       8.30       16       i         134       810       100       oc       n       9/12/29       18.1       34.6       8.34       6       i         135       821       50       r       n       9/14/29       21.5       35.0       8.37       5       i         135       822       100       r       n       9/14/29       18.7       34.8       8.34       5       i         135       825       50       r       p       9/14/29       18.7       34.8       8.34       5       i         135       826       100       r       p       9/14/29       18.7       34.8       8.34       5       i         136       829       100       oc       n       9/16/29       18.6       35.0       8.39       3       i         136       834       100       oc       p       9/16/29       18.6       35.0       8.39       3       i <td>130</td> <td>783</td> <td>100</td> <td></td> <td></td> <td>9/ 4/29</td> <td>8.8</td> <td>33.7</td> <td></td> <td>176</td> <td></td>   | 130     | 783    | 100 |    |    | 9/ 4/29   | 8.8           | 33.7 |      | 176                                  |         |
| 134     810     100     oc     n     9/12/29     18.1     34.6     8.34     6     i       134     817     100     oc     p     9/12/29     18.1     34.6     8.34     6     i       135     821     50     r     n     9/14/29     21.5     35.0     8.37     5     i       135     822     100     r     n     9/14/29     18.7     34.8     8.34     5     i       135     826     100     r     p     9/14/29     18.7     34.8     8.34     5     i       136     829     100     oc     n     9/16/29     18.6     35.0     8.39     3     i       136     834     100     oc     p     9/16/29     18.6     35.0     8.39     3     i       137     838     100     oc     p     9/18/29     21.5     35.1     8.30     5     i       138     845     100     r     n     9/20/29     22.2     34.8     8.31     3     i       139     855     100     oc     n     9/22/29     22.4     35.2     8.28     6     i       140     <   | 131     | 789    |     | oc |    | 9/ 6/29   |               |      | 8.32 | 4.0                                  |         |
| 134     817     100     oc     p     9/12/29     18.1     34.6     8.34     6     i       135     821     50     r     n     9/14/29     21.5     35.0     8.37     5     i       135     822     100     r     n     9/14/29     18.7     34.8     8.34     5     i       135     826     100     r     p     9/14/29     18.7     34.8     8.34     5     i       136     829     100     oc     n     9/16/29     18.6     35.0     8.39     3     i       136     834     100     oc     p     9/16/29     18.6     35.0     8.39     3     i       137     838     100     oc     n     9/18/29     21.5     35.1     8.30     5     i       138     845     100     r     n     9/20/29     22.2     34.8     8.31     3     i       138     848     50     r     p     9/20/29     25.6     34.7     8.30     3     i       139     851     100     oc     n     9/22/29     22.4     35.2     8.28     6     i       139 <td< td=""><td>132</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>16</td><td>1</td></td<>  | 132     |        |     |    |    |           |               |      |      | 16                                   | 1       |
| 135 821 50 r n 9/14/29 21.5 35.0 8.37 5 i<br>135 822 100 r n 9/14/29 18.7 34.8 8.34 5 i<br>135 825 50 r p 9/14/29 21.5 35.0 8.37 5 i<br>135 826 100 r p 9/14/29 18.7 34.8 8.34 5 i<br>136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 i<br>136 834 100 oc p 9/16/29 18.6 35.0 8.39 3 i<br>137 838 100 oc n 9/18/29 21.5 35.1 8.30 5 i<br>138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i<br>138 848 50 r p 9/20/29 22.2 34.8 8.31 3 i<br>139 855 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   |         |        |     |    |    |           |               |      |      |                                      | 1       |
| 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 i<br>136 834 100 oc p 9/16/29 18.6 35.0 8.39 3 i<br>137 838 100 oc n 9/18/29 21.5 35.1 8.30 5 i<br>138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i<br>138 848 50 r p 9/20/29 25.6 34.7 8.30 3 i<br>139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   |         |        |     |    |    |           |               |      |      | 5                                    | i       |
| 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 i<br>136 834 100 oc p 9/16/29 18.6 35.0 8.39 3 i<br>137 838 100 oc n 9/18/29 21.5 35.1 8.30 5 i<br>138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i<br>138 848 50 r p 9/20/29 25.6 34.7 8.30 3 i<br>139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   | 135     |        |     |    |    |           |               |      |      | 5                                    |         |
| 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 i<br>136 834 100 oc p 9/16/29 18.6 35.0 8.39 3 i<br>137 838 100 oc n 9/18/29 21.5 35.1 8.30 5 i<br>138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i<br>138 848 50 r p 9/20/29 25.6 34.7 8.30 3 i<br>139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   | 135     | 825    |     |    |    |           |               |      | 8.37 | 5                                    | i       |
| 136 829 100 oc n 9/16/29 18.6 35.0 8.39 3 i<br>136 834 100 oc p 9/16/29 18.6 35.0 8.39 3 i<br>137 838 100 oc n 9/18/29 21.5 35.1 8.30 5 i<br>138 845 100 r n 9/20/29 22.2 34.8 8.31 3 i<br>138 848 50 r p 9/20/29 25.6 34.7 8.30 3 i<br>139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   |         |        |     |    |    |           |               |      |      | 5                                    | i       |
| 136     834     100     oc     p     9/16/29     18.6     35.0     8.39     3     i       137     838     100     oc     n     9/18/29     21.5     35.1     8.30     5     i       138     845     100     r     n     9/20/29     22.2     34.8     8.31     3     i       138     848     50     r     p     9/20/29     25.6     34.7     8.30     3     i       139     851     100     oc     n     9/22/29     22.4     35.2     8.28     6     i       139     855     100     oc     p     9/22/29     22.4     35.2     8.28     6     i       140     858     100     r     n     10/3/29     25.5     35.0     8.34     7  |         |        |     |    |    |           | 18.6          | 35.0 | 8.39 | 3                                    | i       |
| 138     845     100     r     n     9/20/29     22.2     34.8     8.31     3     i       138     848     50     r     p     9/20/29     25.6     34.7     8.30     3     i       139     851     100     oc     n     9/22/29     22.4     35.2     8.28     6     i       139     855     100     oc     p     9/22/29     22.4     35.2     8.28     6     i       140     858     100     r     n     10/3/29     25.5     35.0     8.34     7  | 136     | 834    |     |    |    | 9/16/29   |               |      |      | 3                                    | i       |
| 139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   | 137     |        |     | oc | n  |           |               |      |      | 5                                    |         |
| 139 851 100 oc n 9/22/29 22.4 35.2 8.28 6 i<br>139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7   | 138     |        |     |    |    |           |               |      |      | 3                                    |         |
| 139 855 100 oc p 9/22/29 22.4 35.2 8.28 6 i<br>140 858 100 r n 10/3/29 25.5 35.0 8.34 7  |         |        |     |    |    |           |               |      |      | 3                                    |         |
| 140 858 100 r n 10/3/29 25.5 35.0 8.34 7 t   |         |        |     |    |    |           |               |      |      | 6                                    |         |
| 110 000 100 1  |         |        |     |    |    |           |               |      |      | 7                                    |         |
| 140 863 100 r p 10/3/29 25.5 35.0 8.34 7 i   |         |        |     |    |    |           |               |      |      | ż                                    | i       |

Table 50. Distributional and environmental records for Ceratium tenue--Concluded

| Station | Sample | Depth | Relative  | Appa- | Date     | Temperature | Salinity | рH    | PO <sub>4</sub>   | Variety |
|---------|--------|-------|-----------|-------|----------|-------------|----------|-------|-------------------|---------|
| Deation | Dampie | (m)   | abundance | ratus | Date     | (°C)        | (0/00)   | PII   | mg/m <sup>3</sup> | variety |
|         |        |       |           |       | 1        |             |          |       | 1                 |         |
| 141     | 869    | 50    | r         | p     | 10/ 5/29 | 24.8        | 35.3     | 8.34  | 5                 | i       |
| 141     | 870    | 50    | oc        | p     | 10/ 5/29 | 24.8        | 35.3     | 8.34  | 5<br>5            | i       |
| 141     | 871    | 100   | r         | p     | 10/ 5/29 | 20.0        | 35.0     | 8.33  | 5                 | i       |
| 142     | 873    | 50    | r         | n     | 10/ 7/29 | 21.8        | 34.8     | 8.30  | 5<br>5            | i       |
| 142     | 874    | 100   | c         | n     | 10/ 7/29 | 16.6        | 34.4     | 8.27  | 7                 | ï       |
| 142     | 877    | 50    | r         | p     | 10/ 7/29 | 21.8        | 34.8     | 8.30  | 5                 | i       |
| 142     | 878    | 100   | r         | p     | 10/ 7/29 | 16.6        | 34.4     | 8.27  | 7                 | i       |
| 144     | 888    | 50    | oc        | p     | 10/11/29 | 21.1        | 34.7     | 8.33  | 6                 | i       |
| 144     | 889    | 100   | oc        | p     | 10/11/29 | 16.6        | 34.5     | 8.37  | 6                 | Ť       |
| 145     | 892    | 100   | r         | n     | 10/13/29 | 16.0        | 34.1     | 8.31  | 6                 | Ť       |
| 146     | 896    | 0     | r         | p     | 10/15/29 | 22.4        | 34.9     | 8.37  | 6                 | Ť       |
| 146     | 898    | 100   | oc        | n -   | 10/15/29 | 19.7        | 34.3     | 8.26  | 7                 | i       |
| 146     | 901    | 50    | r         |       | 10/15/29 | 22.4        | 34.9     | 8.30  | 6                 | +       |
| 146     | 902    | 100   | oc        | p     | 10/15/29 | 19.7        | 34.3     | 8.26  | 6 7               |         |
| 147     | 904    | 50    |           | p     | 10/17/29 | 23.1        | 35.3     | 8.29  | 5                 | +       |
| 147     | 904    | 100   | r         | n     | 10/17/29 | 19.2        | 35.0     | 8.29  | 5                 |         |
| 147     |        | 50    |           | n     | 10/17/29 | 23.1        | 35.3     | 8.29  | 5                 |         |
|         | 908    |       | r         | p     |          | 19.2        | 35.0     | 8.29  | 5                 |         |
| 147     | 909    | 100   | oc        | p     | 10/17/29 |             | 35.0     |       |                   | L       |
| 148     | 912    | 100   | r         | n     | 10/19/29 | 20.0        |          | ***** | ***               | T.      |
| 148     | 919    | 100   | r         | p     | 10/19/29 | 20.0        | 35.0     | 0.07  | ***               | Ţ,      |
| 149     | 921    | 50    | oc        | n     | 10/21/29 | 23.3        | 35.0     | 8.37  | 6                 | 1       |
| 149     | 922    | 100   | r         | n     | 10/21/29 | 20.3        | 34.9     | 8.38  | 6                 | 1       |
| 149     | 927    | 0     | r         | p     | 10/21/29 | 23.5        | 35.0     | 8.34  | 6                 | 1       |
| 150     | 929    | 0     | r         | n     | 10/23/29 | 25.6        | 34.7     | 8.39  | 7                 | 1       |
| 150     | 930    | 50    | r         | n     | 10/23/29 | 22.8        | 34.8     | 8.35  | 10                | 1       |
| 150     | 931    | 100   | r         | n     | 10/23/29 | 19.6        | 34.6     | 8.32  | 11                | t       |
| 151     | 938    | 50    | oc        | n     | 10/26/29 | 18.3        | 34.4     |       |                   | t       |
| 151     | 939    | 100   | r         | n     | 10/26/29 | 12.5        | 34.6     |       |                   | i       |
| 151     | 941    | 0     | r         | p     | 10/26/29 | 26.0        | 34.0     | ****  |                   | i       |
| 152     | 946    | 100   | ос        | n     | 10/27/29 | 11.4        | 34.7     | 7.76  | 75                | i       |
| 152     | 950    | 100   | r         | p     | 10/27/29 | 11.4        | 34.7     | 7.76  | 75                | i       |
| 153     | 953    | 100   | ОС        | n     | 10/29/29 | 20.5        | 34.7     | 8.28  | 31                | i       |
| 153     | 956    | 50    | r         | p     | 10/29/29 | 28.1        | 34.4     | 8.39  | 7                 | i       |
| 153     | 957    | 100   | r         | p     | 10/29/29 | 20.5        | 34.7     | 8.28  | 31                | i       |
| 154     | 960    | 100   | oc        | p     | 10/31/29 | 25.3        | 34.8     | 7.93  | 21                | i       |
| 158     | 983    | 0     | С         | 'n    | 11/ 8/29 | 28.2        | 35.6     | 8.34  | 36                | i       |
| 158     | 985    | 100   | c         | n     | 11/ 8/29 | 27.6        | 35.9     | 8,39  | 48                | i       |
| 159     | 990    | 0     | ос        | n     | 11/11/29 | 28.6        | 35.7     | 8.37  | 15                | i       |
| 159     | 991    | 50    | r         |       | 11/11/29 | 28.5        | 35.7     | 8.39  | 15                | t       |
| 159     | 992    | 100   | oc        | n     | 11/11/29 | 28.0        | 35.7     | 8.37  | 23                | t       |
| 160     | 1002   | 50    | oc        | n     | 11/13/29 | 28.6        | 35.6     | 8.39  | 15                | i       |
| 160     | 1003   | 100   | r         | n     | 11/13/29 | 28.5        | 35.7     | 8.44  | 16                | t       |
| 100     | 1000   | 100   | -         | 44    | 11/10/20 | 20.0        | 0011     | 0171  |                   |         |

Abbreviations: i=var. inclinatum; t=var. tenuissimum.

Table 51. Distributional and environmental records for Ceratium longissimum

| Station  | Sample     | Depth (m)  | Relative abundance | Appa-<br>ratus | Date               | Temperature<br>(°C) | Salinity<br>(o/oo) | pН           | PO4<br>mg/m3          |
|----------|------------|------------|--------------------|----------------|--------------------|---------------------|--------------------|--------------|-----------------------|
|          |            |            |                    |                |                    |                     |                    |              |                       |
| 1b       | 8          | 100        | r,                 | n              | 5/16/28            | (20.3               | 35.5               | 8.18         | 36)                   |
| 15       | 99         | 100        | r                  | p              | 8/11/28            | 18.4                | 36.4               | 8.20         | 19                    |
| 16       | 107        | 50         | r                  | n              | 8/13/28            | 24.4                | 36.4               | 8.23         | . 8                   |
| 23       | 150        | 100        | r                  | n              | 8/29/28            | 16.6                | 36.0               | 8.18         | 75                    |
| 25       | 161        | 50         | r                  | n              | 9/ 3/28            | 21.5                | 36.0               | 8.22         | 12                    |
| 35       | 204        | 50         | r                  | n              | 10/26/28           | 16.8                | 34.7               | 7.92         | 138                   |
| 37       | 221        | 50         | r                  | p              | 11/ 1/28           | 18.8                | 34.5               | 8.00         | 121                   |
| 45<br>47 | 258        | 100        | r                  | n              | 11/19/28           | 18.6                | 35.1               | 8.00         | 50                    |
| 75       | 268<br>464 | 100        | r                  | n              | 11/23/28           | 22.7                | 36.2               | 8.23         | 20                    |
| 78       | 477        | 100<br>100 | r                  | n              | 2/14/29            | 17.8                | 35.4               | 8.00         | 75<br>34              |
| 80       | 490        | 100        | r                  | n              | 2/20/29            | 21.9                | 36.2               | 8.14         | 32                    |
| 109      | 656        | 100        | r                  | p              | 2/24/29            | 23.4<br>19.4        | 36.2<br>34.8       | 8.16<br>8.18 | 34                    |
| 112      | 676        | 100        | r                  | n              | 5/29/29<br>6/ 5/29 | 19.8                | 34.7               | 8.20         | 5<br>8                |
| 132      | 799        | 100        | r                  | n              | 9/ 8/29            | 14.3                | 33.4               | 8.30         | 16                    |
| 133      | 806        | 100        | oc                 | n<br>n         | 9/10/29            | 18.4                | 34.8               | 8.31         | . 7                   |
| 134      | 810        | 100        | oc                 | n              | 9/12/29            | 18.1                | 34.6               | 8.34         |                       |
| 134      | 817        | 100        | r                  |                | 9/12/29            | 18.1                | 34.6               | 8.34         | 6                     |
| 135      | 822        | 100        | r                  | p<br>n         | 9/14/29            | 18.7                | 34.8               | 8.34         | 5                     |
| 136      | 829        | 100        | oc oc              | n              | 9/16/29            | 18.6                | 35.0               | 8.39         | 3                     |
| 137      | 838        | 100        | r                  | n              | 9/18/29            | 21.5                | 35.1               | 8.30         | 5                     |
| 142      | 874        | 100        | r                  | n              | 10/ 7/29           | 16.6                | 34.4               | 8.27         | 6<br>5<br>3<br>5<br>7 |
| 142      | 878        | 100        | r                  | p              | 10/ 7/29           | 16.6                | 34.4               | 8.27         | ż                     |
| 142      | 879        | 100        | r                  | p              | 10/ 7/29           | 16.6                | 34.4               | 8.27         | 7                     |

Table 51. Distributional and environmental records for Ceratium longissimum--Concluded

| Station | Sample | Depth (m) | Relative<br>abundance | Appa-<br>ratus | Date     | Temperature<br>(°C) | Salinity<br>(o/oo) | pН    | PO4<br>mg/m <sup>3</sup> |
|---------|--------|-----------|-----------------------|----------------|----------|---------------------|--------------------|-------|--------------------------|
| 146     | 898    | 100       | oc                    | n              | 10/15/29 | 19.7                | 34.3               | 8.26  | 7                        |
| 147     | 905    | 100       | oc                    | n              | 10/17/29 | 19.2                | 35.0               | 8.29  | 5                        |
| 148     | 912    | 100       | oc                    | n              | 10/19/29 | 20.0                | 35.0               |       |                          |
| 149     | 922    | 100       | oc                    | n              | 10/21/29 | 20.3                | 34.9               | 8.38  | 6                        |
| 150     | 931    | 100       | r                     | n              | 10/23/29 | 19.6                | 34.6               | 8.32  | 11                       |
| 151     | 938    | 50        | Г                     | n              | 10/26/29 | 18.3                | 34.4               | ***** |                          |
| 151     | 939    | 100       | r                     | n,             | 10/26/29 | 12.5                | 34.6               |       |                          |
| 159     | 992    | 100       | r                     | n              | 11/11/29 | 28.0                | 35.7               | 8.37  | ° 23                     |

Table 52. Distributional and environmental records for Ceratium arcticum

| Station  | Sample  | Depth (m)                             | Relative abundance                                  | Appa-<br>ratus | Date  | Temperature<br>(°C)   | Salinity<br>(0/00)   | pН   | PO <sub>4</sub> mg/m <sup>3</sup>   | Variety                               |
|--|---|---------------------------------------|---|----------------|---|---|--|--|---|---------------------------------------|
| 6f<br>6g<br>6h<br>77<br>77<br>8<br>8<br>8<br>8<br>9<br>9<br>10<br>10<br>11<br>11<br>11<br>11<br>12<br>12<br>12<br>12<br>13<br>13<br>13<br>13<br>14<br>14<br>14<br>14<br>15<br>15<br>15<br>16<br>16<br>17<br>17<br>17<br>18<br>18<br>19<br>20<br>20<br>20<br>21<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22 | 53<br>54<br>55<br>56<br>57<br>58<br>59<br>60<br>61<br>64<br>65<br>68<br>69<br>70<br>73<br>74<br>76<br>78<br>80<br>81<br>82<br>83<br>85<br>86<br>87<br>91<br>92<br>93<br>94<br>95<br>97<br>98<br>99<br>101<br>102<br>104<br>105<br>108<br>111<br>112<br>113<br>116<br>118<br>123<br>124<br>127<br>129<br>130<br>134<br>139<br>140<br>170<br>170<br>170<br>170<br>170<br>170<br>170<br>17 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | abundance  a a a a a oc c c c c c c c c c c c c c c |                | 7/ 9/28 7/10/28 7/10/28 7/11/28 7/13/28 7/13/28 7/15/28 7/15/28 7/15/28 7/15/28 7/28/28 7/28/28 7/30/28 8/ 1/28 8/ 1/28 8/ 1/28 8/ 5/28 8/ 5/28 8/ 5/28 8/ 5/28 8/ 7/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 9/28 8/ 1/28 | (10.6 (10.6 (10.6 (10.6 (10.6 (10.6 (10.6 (10.6 (10.6 (10.7 (10.6 (10.7 (10.6 (10.7 (10.6 (10.7 (10.6 (10.7 (10.6 (10.7 (10.6 (10.7 (10.6 (10.7 (10.6 (10.6 (10.7 (10.6 (10.6 (10.7 (10.6 | 35.4<br>35.4<br>35.4<br>35.2<br>35.2<br>35.2<br>35.2<br>35.2<br>35.3<br>35.1<br>34.9<br>34.9<br>34.9<br>34.9<br>34.9<br>34.9<br>34.9<br>34.9<br>35.6<br>36.6<br>36.6<br>36.6<br>36.6<br>36.6<br>36.7<br>36.7<br>36.6<br>36.8<br>36.7<br>36.7<br>36.7<br>36.7<br>36.7<br>36.7<br>36.7<br>36.7<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8<br>36.8 | 8.11<br>8.11<br>8.08<br>8.03<br>7.93<br>7.95<br>7.95<br>8.08<br>8.09<br>7.91<br>8.09<br>7.92<br>8.06<br>8.10<br>7.91<br>8.09<br>7.87<br>8.09<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10<br>8.10 | 28) 28) 28) 28) 28) 28) 27 57 520 55 28 34 47 57 13 27 54 20 55 28 34 52 7 63 63 62 7 95 63 62 63 63 62 63 63 62 63 63 63 63 63 63 63 63 63 63 63 63 63 | l l l l l l l l l l l l l l l l l l l |

Table 52. Distributional and environmental records for Ceratium arcticum--Concluded

| Station | Sample | Depth (m) | Relative abundance | Appa-<br>ratus | Date    | Temperature<br>(°C) | Salinity<br>(o/oo) | pН   | PO4<br>mg/m <sup>3</sup> | Variety |
|---------|--------|-----------|--------------------|----------------|---------|---------------------|--------------------|------|--------------------------|---------|
| 118     | 716    | 100       | r                  | n              | 7/ 5/29 | 6.1                 | 33.8               | 7.94 | 114                      | 1       |
| 118     | 719    |           | r                  | **             | 7/ 5/29 |                     |                    |      |                          | î       |
| 120     | 726    | 0         | oc                 | n              | 7/ 9/29 | 7.2                 | 33.0               | 7.98 | 137                      | a, 1    |
| 120     | 727    | 50        | oc                 | n              | 7/ 9/29 | 2.2                 | 33.1               | 7.90 | 177                      | a, i    |
| 120     | 728    | 100       | г                  | n              | 7/ 9/29 | 2.0                 | 33.2               | 7.84 | 197                      | a       |
| 120     | 729    | 0         | r                  | p              | 7/ 9/29 | 7.2                 | 33.0               | 7.98 | 137                      | a, 1    |
| 121     | 732    | 0         | oc                 | 'n             | 7/11/29 | 7.5                 | 32.9               | 7.98 | 141                      | a       |
| 121     | 733    | 50        | г                  | n              | 7/11/29 | 3.6                 | 33.1               | 7.92 | 159                      | a       |
| 121     | 734    | 100       | r                  | n              | 7/11/29 | 2.1                 | 33.2               | 7.86 | 184                      | 1       |
| 121     | 735    | 0         | oc                 | p              | 7/11/29 | 7.5                 | 32.9               | 7.98 | 141                      | a       |
| 122     | 738    | 0         | С                  | 'n             | 7/13/29 | 8.2                 | 32.8               | 7.98 | 130                      | 1       |
| 122     | 739    | 50        | ${f r}$ .          | n              | 7/13/29 | 3.6                 | 33.1               | 7.94 | 142                      | 1       |
| 122     | 740    | 100       | r                  | n              | 7/13/29 | 2.4                 | 33.1               | 7.90 | 161                      | 1       |
| 122     | 741    | 0         | С                  | p              | 7/13/29 | 8.2                 | 32.8               | 7.98 | 130                      | 1       |
| 123     | 744    | 0         | oc                 | n              | 7/15/29 | 8.1                 | 32.8               | 8.03 | 113                      | 1       |
| 123     | 745    | 50        | oc                 | n              | 7/15/29 | 4.4                 | <b>32.</b> 9       | 7.94 | 150                      | 1       |
| 123     | 746    | 100       | oc                 | n              | 7/15/29 | 3.0                 | 33.4               | 7.79 | <b>20</b> 9              | 1       |
| 123     | 747    | 0         | oc                 | р              | 7/15/29 | 8.1                 | <b>32.</b> 8       | 8.03 | 113                      | 1       |
| 123     | 748    | 50        | r                  | p              | 7/15/29 | 4.4                 | 32.9               | 7.94 | 150                      | 1       |
| 124     | 749    | 0         | С                  | n              | 7/17/29 | 9.3                 | 32.7               | 8.0△ | 103                      | 1       |
| 124     | 750    | 50        | Г                  | n              | 7/17/29 | 5.4                 | 32.7               | 8.02 | 110                      | 1       |
| 124     | 751    | 100       | r                  | n              | 7/17/29 | 4.0                 | 33.6               | 7.64 | 228                      | 1       |
| 124     | 752    | 0         | r                  | p              | 7/17/29 | 9.3                 | 32.7               | 8.04 | 103                      | 1       |
| 125     | 755    | 0         | r                  | n              | 7/19/29 | 10.5                | 32.8               | 8.03 | 125                      | 1       |
| 125     | 757    | 100       | r                  | n              | 7/19/29 | 4.2                 | 32.9               | 7.90 | 175                      | 1       |
| 146     | 898    | 100       | r                  | n              | 7/19/29 | 4.2                 | 32.9               | 7.90 | 175                      | 1       |

Abbreviations: a=var. arcticum; l=var. longipes; v=var. ventricosum.

Table 53. Distributional and environmental records for Ceratium hexacanthum

| Station   Sample   Depth   Relative   abundance   ratus   Date   Temperature   Salinity   (o/oo)   pH   mg/m3  |         |        |       |           |       |         |             |          |      |                 |
|--|---------|--------|-------|-----------|-------|---------|-------------|----------|------|-----------------|
| 1  | Station | Comple | Depth | Relative  | Appa- | Data    | Temperature | Salinity |      | PO <sub>4</sub> |
| 1  | Station | Sample |       | abundance |       | Date    |             |          | pH   | mg/m3           |
| 1 2 70 r n 5/12/28 (22.4 36.4 8.17 35) 1a 5 0 oc n 5/14/28 (22.3 36.3 8.20 46) 1b 6 0 c n 5/14/28 (22.3 36.3 8.20 46) 1b 7 50 c n 5/16/28 (22.3 36.4 8.21 39) 1b 8 100 c n 5/16/28 (22.2 36.4 8.21 39) 1b 8 100 c n 5/16/28 (20.3 35.5 8.18 36) 2 12 50 oc n 5/16/28 (20.3 35.5 8.18 36) 2 12 13 100 oc n 5/18/28 20.5 36.4 8.21 46 2 13 100 oc n 5/18/28 20.5 36.4 8.21 33 2 14 0 c n 5/18/28 19.8 36.4 8.21 33 2 14 0 c n 5/18/28 19.8 36.4 8.23 58 4 24 50 r n 5/30/28 (12.4 35.6 8.15 21) 5a 33 0 oc n 5/30/28 (12.4 35.6 8.15 21) 6 35 0 r n 5/30/28 12.4 35.6 8.15 21) 6 35 0 r n 5/31/28 12.4 35.6 8.15 21) 6 36 37 100 oc n 5/31/28 11.6 35.6 8.12 32 6 37 100 oc n 5/31/28 11.3 35.6 8.08 41 6a 42 0 oc n 5/31/28 11.3 35.6 8.08 41 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r n 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 19.8 36.5 8.21 8 16 106 107 50 r n 8/11/28 19.8 36.6 8.28 12  |         |        | ()    |           |       |         | ( )         | (0,00)   |      |                 |
| 1 2 70 r n 5/12/28 (22.4 36.4 8.17 35) 1a 5 0 oc n 5/14/28 (22.3 36.3 8.20 46) 1b 6 0 c n 5/14/28 (22.3 36.3 8.20 46) 1b 7 50 c n 5/16/28 (22.3 36.4 8.21 39) 1b 8 100 c n 5/16/28 (22.2 36.4 8.21 39) 1b 8 100 c n 5/16/28 (20.3 35.5 8.18 36) 2 12 50 oc n 5/16/28 (20.3 35.5 8.18 36) 2 12 13 100 oc n 5/18/28 20.5 36.4 8.21 46 2 13 100 oc n 5/18/28 20.5 36.4 8.21 33 2 14 0 c n 5/18/28 19.8 36.4 8.21 33 2 14 0 c n 5/18/28 19.8 36.4 8.23 58 4 24 50 r n 5/30/28 (12.4 35.6 8.15 21) 5a 33 0 oc n 5/30/28 (12.4 35.6 8.15 21) 6 35 0 r n 5/30/28 12.4 35.6 8.15 21) 6 35 0 r n 5/31/28 12.4 35.6 8.15 21) 6 36 37 100 oc n 5/31/28 11.6 35.6 8.12 32 6 37 100 oc n 5/31/28 11.3 35.6 8.08 41 6a 42 0 oc n 5/31/28 11.3 35.6 8.08 41 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r n 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 19.8 36.5 8.21 8 16 106 107 50 r n 8/11/28 19.8 36.6 8.28 12  | 1       | 1      | 0     | 00        | n     | 5/19/98 | 24.0        | 36.2     | 9 16 | 2.4             |
| 1b         6         0         c         n         5/16/28         (22.2         36.4         8.21         39)           1b         8         100         c         n         5/16/28         (22.2         36.4         8.21         39)           1b         8         100         c         n         5/16/28         (20.3         35.5         8.18         36)           2         12         50         oc         n         5/18/28         20.5         36.4         8.21         46           2         13         100         oc         n         5/18/28         20.5         36.4         8.21         33           2         14         0         c         n         5/18/28         20.5         36.4         8.21         33           4         24         50         r         n         5/30/28         112.4         35.6         8.15         21           5a         34         0         r         n         5/30/28         112.4         35.6         8.15         21           6         35         0         r         n         5/31/28         12.4         35.6         8.15         21  |         | 9      |       |           |       |         |             |          |      |                 |
| 1b         6         0         c         n         5/16/28         (22.2         36.4         8.21         39)           1b         8         100         c         n         5/16/28         (22.2         36.4         8.21         39)           1b         8         100         c         n         5/16/28         (20.3         35.5         8.18         36)           2         12         50         oc         n         5/18/28         20.5         36.4         8.21         46           2         13         100         oc         n         5/18/28         20.5         36.4         8.21         33           2         14         0         c         n         5/18/28         20.5         36.4         8.21         33           4         24         50         r         n         5/30/28         112.4         35.6         8.15         21           5a         34         0         r         n         5/30/28         112.4         35.6         8.15         21           6         35         0         r         n         5/31/28         12.4         35.6         8.15         21  |         | 5      |       |           |       |         |             |          |      |                 |
| 1b         7         50         c         n         5/16/28         (22.2         36.4         8.21         39)           1b         8         100         c         n         5/16/28         (20.3         35.5         8.18         36)           2         12         50         oc         n         5/18/28         20.5         36.4         8.21         46           2         13         100         oc         n         5/18/28         19.8         36.4         8.21         33           2         14         0         c         n         5/18/28         20.5         36.4         8.21         33           4         24         50         r         n         5/23/28         14.4         36.0         8.15         21           5a         33         0         oc         n         5/30/28         12.4         35.6         8.15         21           6a         36         50         r         n         5/31/28         11.6         35.6         8.15         21           6         36         50         r         n         5/31/28         11.3         35.6         8.15         21   |         | 6      |       |           |       |         |             |          |      |                 |
| 1b         8         100         c         n         5/16/28         (20.3)         35.5         8.18         36/           2         12         50         oc         n         5/18/28         20.5         36.4         8.21         46           2         13         100         oc         n         5/18/28         19.8         36.4         8.21         33           2         14         0         c         n         5/18/28         20.5         36.4         8.23         58           4         24         50         r         n         5/23/28         14.4         36.0         8.15         21           5a         33         0         oc         n         5/30/28         (12.4         35.6         8.15         21           6         35         0         r         n         5/31/28         12.4         35.6         8.15         21           6         36         50         r         n         5/31/28         11.4         35.6         8.15         21           6         37         100         oc         n         5/31/28         11.4         35.6         8.15         21   |         | 7      |       |           |       |         |             |          |      |                 |
| 2 12 50 oc n 5/18/28 20.5 36.4 8.21 46 2 13 100 oc n 5/18/28 19.8 36.4 8.21 33 2 14 0 c n 5/18/28 20.5 36.4 8.23 58 4 24 50 r n 5/18/28 14.4 36.0 8.15 21 5a 33 0 oc n 5/30/28 (12.4 35.6 8.15 21) 5a 34 0 r n 5/30/28 (12.4 35.6 8.15 21) 6 35 0 r n 5/31/28 12.4 35.6 8.15 21) 6 36 37 100 oc n 5/31/28 11.6 35.6 8.15 21) 6 37 100 oc n 5/31/28 11.3 35.6 8.12 32 6 37 100 oc n 5/31/28 (12.4 35.6 8.15 21) 6 40 42 0 oc n 5/31/28 (12.4 35.6 8.15 21) 6 40 42 0 oc n 5/31/28 (12.4 35.6 8.15 21) 6 40 40 oc n 6/2/28 (12.4 35.6 8.15 21) 6 40 40 oc n 6/2/28 (12.4 35.6 8.15 21) 6 40 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6 46 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6 47 100 r n 6/3/28 (12.4 35.6 8.15 21) 6 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6 5 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6 6 47 100 r n 6/3/28 (12.4 35.6 8.15 21) 6 6 48 0 r n 6/2/28 (12.4 35.6 8.15 21) 6 6 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6 6 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6 6 10 0 r n 6/3/28 (12.4 35.6 8.15 21) 6 10 0 r n 8/11/28 19.8 36.5 8.21 8 15 10 10 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 2 100 r n 8/11/28 19.8 36.5 8.21 8 15 10 2 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 19.8 36.5 8.21 8 16 107 50 r n 8/11/28 19.9 36.6 8.28 12 17 110 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8  |         |        |       |           |       |         |             |          |      |                 |
| 2 13 100 oc n 5/18/28 19.8 36.4 8.21 33 2 14 0 c n 5/18/28 20.5 36.4 8.23 58 4 24 50 r n 5/23/28 14.4 36.0 8.15 21 5a 33 0 oc n 5/30/28 (12.4 35.6 8.15 21) 5a 34 0 r n 5/30/28 (12.4 35.6 8.15 21) 6 35 0 r n 5/31/28 12.4 35.6 8.15 21 6 36 50 r n 5/31/28 11.6 35.6 8.15 21 6 36 37 100 oc n 5/31/28 11.6 35.6 8.12 32 6 37 100 oc n 5/31/28 11.3 35.6 8.08 41 6a 42 0 oc n 5/31/28 11.3 35.6 8.15 21) 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (11.3 35.6 8.15 21) 6c 47 100 r n 6/3/28 (11.3 35.6 8.15 21) 6c 49 0 c n 6/2/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/2/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 101 50 r p 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.6 8.28 12 | 2       |        |       |           |       |         |             |          |      |                 |
| 2 14 0 c n 5/18/28 20.5 36.4 8.23 58 4 24 50 r n 5/23/28 14.4 36.0 8.15 21 5a 33 0 oc n 5/30/28 (12.4 35.6 8.15 21) 5a 34 0 r n 5/30/28 (12.4 35.6 8.15 21) 6 35 0 r n 5/31/28 12.4 35.6 8.15 21 6 36 50 r n 5/31/28 11.6 35.6 8.12 32 6 37 100 oc n 5/31/28 11.3 35.6 8.12 32 6 37 100 oc n 5/31/28 (12.4 35.6 8.15 21) 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (12.4 35.6 8.15 21) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 8/11/28 18.4 36.4 8.20 19 15 101 50 r n 8/11/28 18.4 36.4 8.20 19 15 102 100 r n 8/11/28 18.4 36.4 8.20 19 15 101 50 r n 8/11/28 18.4 36.4 8.20 19 16 104 50 r n 8/11/28 18.4 36.4 8.20 19 16 106 0 r n 8/11/28 18.4 36.4 8.20 19 16 107 50 r n 8/11/28 18.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 17 110 50 c n 8/15/28 21.9 36.6 8.28 12   | 2       |        |       |           |       |         |             |          |      |                 |
| 4       24       50       r       n       5/23/28       14.4       36.0       8.15       21         5a       34       0       r       n       5/30/28       (12.4       35.6       8.15       21)         6       35       0       r       n       5/31/28       12.4       35.6       8.15       21         6       36       50       r       n       5/31/28       11.6       35.6       8.12       32         6       37       100       oc       n       5/31/28       11.3       35.6       8.12       32         6a       42       0       oc       n       5/31/28       (12.4       35.6       8.15       21)         6b       43       0       r       n       6/2/28       (12.4       35.6       8.15       21)         6b       43       0       r       n       6/2/28       (12.4       35.6       8.15       21)         6b       44       0       oc       n       6/2/28       (12.4       35.6       8.15       21)         6b       45       0       c       n       6/2/28       (12.4       35.6  | 2       |        |       |           |       |         |             |          |      |                 |
| 5a         33         0         oc         n         5/30/28         (12.4         35.6         8.15         21)           5a         34         0         r         n         5/30/28         (12.4         35.6         8.15         21)           6         35         0         r         n         5/31/28         12.4         35.6         8.15         21           6         36         50         r         n         5/31/28         11.6         35.6         8.15         21           6         37         100         oc         n         5/31/28         11.3         35.6         8.08         41           6a         42         0         oc         n         5/31/28         (12.4         35.6         8.15         21)           6b         43         0         r         n         6/2/28         (12.4         35.6         8.15         21)           6b         44         0         oc         n         6/2/28         (12.4         35.6         8.15         21)           6b         46         0         oc         n         6/2/28         (12.4         35.6         8.15         21) <td>4</td> <td>24</td> <td>50</td> <td></td> <td></td> <td>5/23/28</td> <td>14.4</td> <td></td> <td>8.15</td> <td></td>  | 4       | 24     | 50    |           |       | 5/23/28 | 14.4        |          | 8.15 |                 |
| 5a   | 5a      | 33     | 0     | ос        |       |         | (12.4       | 35.6     | 8.15 | 21)             |
| 6 35 0 r n 5/31/28 12.4 35.6 8.15 21 6 36 36 37 100 oc n 5/31/28 11.6 35.6 8.12 32 6 37 100 oc n 5/31/28 11.3 35.6 8.08 41 6a 42 0 oc n 5/31/28 (12.4 35.6 8.15 21) 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/2/28 (12.4 35.6 8.15 21) 6c 48 0 r n 6/2/28 (12.4 35.6 8.15 21) 6c 48 0 r n 6/3/28 (11.3 35.6 8.15 21) 6c 48 0 r n 6/3/28 (11.3 35.6 8.15 21) 6c 49 0 c n 6/2/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 1 50 r n 8/11/28 19.8 36.5 8.21 8 15 10 10 50 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 106 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 17 17 110 50 r n 8/15/28 21.9 36.6 8.28 12   | 5a      | 34     | 0     | r         | n     |         | (12.4       | 35.6     | 8.15 | 21)             |
| 6 37 100 oc n 5/31/28 11.3 35.6 8.08 41 6a 42 0 oc n 5/31/28 (12.4 35.6 8.15 21) 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12  | 6       | 35     | 0     |           | n     |         | 12.4        | 35.6     | 8.15 | 21              |
| 6a 42 0 0c n 5/31/28 (12.4 35.6 8.15 21) 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 0c n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 0c n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (12.4 35.6 8.15 21) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 6/3/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 0c p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 19.8 36.4 8.20 19 16 106 50 r p 8/13/28 24.4 36.4 8.20 19 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12   |         |        |       | r         | n     | 5/31/28 |             | 35.6     | 8.12 |                 |
| 6b 43 0 r n 6/2/28 (12.4 35.6 8.15 21) 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (12.4 35.6 8.15 21) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/4/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 18.4 36.4 8.20 19 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 107 50 r p 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r p 8/15/28 21.9 36.6 8.28 12  |         |        |       | oc        | n     |         |             |          |      |                 |
| 6b 44 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (11.3 35.6 8.08 41) 6c 48 0 r n 6/3/28 (11.3 35.6 8.15 21) 6c 49 0 c n 6/4/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12  |         |        |       | ¹OC       | n     |         |             |          |      |                 |
| 6b 45 0 c n 6/2/28 (12.4 35.6 8.15 21) 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (11.3 35.6 8.15 21) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/4/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12   |         |        |       | r         | n     | 6/ 2/28 |             |          |      |                 |
| 6b 46 0 oc n 6/2/28 (12.4 35.6 8.15 21) 6c 47 100 r n 6/3/28 (11.3 35.6 8.08 41) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/4/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/11/28 18.4 36.4 8.20 19 16 106 0 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12   |         |        |       |           | n     | 6/ 2/28 |             |          |      |                 |
| 6c 47 100 r n 6/3/28 (11.3 35.6 8.08 41) 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/4/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12   |         |        |       |           |       |         |             |          |      |                 |
| 6c 48 0 r n 6/3/28 (12.4 35.6 8.15 21) 6c 49 0 c n 6/4/28 (12.4 35.6 8.15 21) 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 106 0 r n 8/13/28 24.4 36.4 8.20 19 16 107 50 r p 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 17 110 50 r p 8/15/28 21.9 36.6 8.28 12  |         |        |       |           |       | 6/ 2/28 |             |          |      |                 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |         |        |       |           |       | 6/ 3/28 |             |          |      |                 |
| 7 57 50 r n 7/13/28 8.2 35.2 8.03 47 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 19.8 36.5 8.21 8 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 104 50 r p 8/13/28 24.4 36.4 8.20 19 16 107 50 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 17 110 50 r p 8/15/28 21.9 36.6 8.28 12 17 112 50 oc n 8/15/28 21.9 36.6 8.28 12  |         |        |       |           |       |         |             |          |      |                 |
| 15 98 50 r p 8/11/28 19.8 36.5 8.21 8 15 99 100 oc p 8/11/28 18.4 36.4 8.20 19 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 19.8 36.5 8.21 8 16 104 50 r p 8/13/28 24.4 36.4 8.20 19 16 106 0 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 25.9 36.2 8.24 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 17 110 50 r p 8/15/28 21.9 36.6 8.28 12 17 112 50 oc n 8/15/28 21.9 36.6 8.28 12   |         |        |       |           |       | 6/ 4/28 | (12.4       |          |      |                 |
| 15 99 100 oc p 8/11/28 18.4 36.4 8.20 19 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 18.4 36.4 8.20 19 16 104 50 r p 8/13/28 24.4 36.4 8.23 8 16 106 0 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 17 110 50 r p 8/15/28 21.9 36.6 8.28 12 17 112 50 oc n 8/15/28 21.9 36.6 8.28 12   |         |        |       |           |       | 7/13/28 |             |          |      |                 |
| 15 101 50 r n 8/11/28 19.8 36.5 8.21 8 15 102 100 r n 8/11/28 18.4 36.4 8.20 19 16 104 50 r p 8/13/28 24.4 36.4 8.23 8 16 106 0 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 17 110 50 r p 8/15/28 21.9 36.6 8.28 12 17 112 50 oc n 8/15/28 21.9 36.6 8.28 12  | 10      |        |       |           |       |         |             |          |      |                 |
| 15   | 10      |        |       |           |       |         |             |          |      |                 |
| 16     10 <sup>4</sup> 50     r     p     8/13/28     24.4     36.4     8.23     8       16     106     0     r     n     8/13/28     25.9     36.2     8.24     8       16     107     50     r     n     8/13/28     24.4     36.4     8.23     8       16     108     100     r     n     8/13/28     19.9     36.5     8.17     13       17     110     50     r     p     8/15/28     21.9     36.6     8.28     12       17     112     50     oc     n     8/15/28     21.9     36.6     8.28     12  |         |        |       |           |       |         |             |          |      |                 |
| 16 106 0 r n 8/13/28 25.9 36.2 8.24 8 16 107 50 r n 8/13/28 24.4 36.4 8.23 8 16 108 100 r n 8/13/28 19.9 36.5 8.17 13 17 110 50 r p 8/15/28 21.9 36.6 8.28 12 17 112 50 oc n 8/15/28 21.9 36.6 8.28 12   | 16      |        |       |           |       |         |             |          |      |                 |
| 16     107     50     r     n     8/13/28     24.4     36.4     8.23     8       16     108     100     r     n     8/13/28     19.9     36.5     8.17     13       17     110     50     r     p     8/15/28     21.9     36.6     8.28     12       17     112     50     oc     n     8/15/28     21.9     36.6     8.28     12   |         |        |       |           |       |         |             |          |      |                 |
| 16 108 100 r n 8/13/28 19.9 36.5 8.17 13<br>17 110 50 r p 8/15/28 21.9 36.6 8.28 12<br>17 112 50 oc n 8/15/28 21.9 36.6 8.28 12  |         |        |       |           |       |         |             |          |      |                 |
| 17 110 50 r p 8/15/28 21.9 36.6 8.28 12<br>17 112 50 oc n 8/15/28 21.9 36.6 8.28 12  |         |        |       |           |       |         |             |          |      |                 |
| 17 112 50 oc n 8/15/28 21.9 36.6 8.28 12   |         |        |       |           |       |         |             |          |      | 12              |
|  |         |        |       |           |       |         |             |          |      |                 |
| 18 115 50 r p 8/17/28 22.4 36.8 8.24 5   |         |        |       |           |       |         |             |          |      |                 |
|  |         |        |       |           |       |         |             |          |      | 5               |
| 18 116 100 r p 8/17/28 20.4 36.8 8.21 5  |         | 116    | 100   |           |       | 8/17/28 | 20.4        | 36.8     | 8.21 | 5               |
| 18 117 0 c n 8/17/28 27.0 37.0 8.23 5  |         | 117    |       |           |       | 8/17/28 |             |          |      | 5               |
|  | 18      | 118    | 50    |           | n     | 8/17/28 |             |          |      |                 |
| 19 122 0 oc n 8/20/28 26.6 37.0 8.34 5   | 19      | 122    | 0     | oc        | n     | 8/20/28 | 26.6        | 37.0     | 8.34 | 5               |

Table 53. Distributional and environmental records for Ceratium hexacanthum--Continued

| Lau            | le 53. Dis  |           |                    |                | records 10           | r Ceratium nex      | ,                |                      |
|----------------|-------------|-----------|--------------------|----------------|----------------------|---------------------|------------------|----------------------|
| Station        | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity (o/oo)  | pH PO4<br>mg/m3      |
|                |             |           | -                  |                | 0.100.100            |                     | 07.4             |                      |
| 19             | 123<br>124  | 50<br>100 | oc                 | n              | 8/20/28<br>8/20/28   | 25.2<br>22.4        | 37.1<br>37.0     | 8.27 5<br>8.25 5     |
| 19<br>20       | 128         | 0         | oc<br>r            | n<br>n         | 8/22/28              | 26.0                | 36.6             | 8.37 5               |
| 20             | 129         | 50        | r                  | n              | 8/22/28              | 25.8                | 36.6             | 8.26 3               |
| 21             | 135         | 0         | r                  | n              | 8/29/28              | 26.6                | 36.3             | 8.32 4               |
| 21             | 136         | 50        | ·r                 | n              | 8/29/28<br>8/29/28   | 24.4<br>27.2        | 36.2<br>35.9     | 8.26 4<br>8.25 4     |
| 23<br>24       | 148<br>154  | 0         | r<br>r             | n<br>n         | 8/31/28              | 27.2                | 35.2             | 8.32 4               |
| 24             | 156         | 100       | r                  | n              | 8/31/28              | 15.6                | 35.6             | 7.96 99              |
| 25             | 161         | 50        | r                  | n              | 9/ 3/28              | 21.5                | 36.0             | 8.22 12              |
| 28             | 176         | 0         | r                  | n              | 9/11/28<br>9/15/28   | 27.6<br>28.0        | 36.3<br>36.1     | 8.29 4<br>8.30 2     |
| 30<br>31       | 188<br>191  | ő         | r                  | n<br>n         | 10/ 3/28             | 28.5                | 34.4             | 8.27 2               |
| 31             | 192         | 50        | r                  | n              | 10/ 3/28             | 28.2                | 35.4             | 8.23 2               |
| 31             | 193         | 100       | С                  | n              | 10/ 3/28             | 23.4                | 36.5             | 8.19 28              |
| 32<br>32       | 194<br>194A | 0         | c<br>or            | n              | 10/ 5/28<br>10/ 5/28 | 28.0<br>28.0        | 36.0<br>36.0     | 8.23 2<br>8.23 2     |
| 32             | 196         | 100       | r                  | p<br>n         | 10/ 5/28             | 22.2                | 36.4             | 8.10 30              |
| 32             | 196A        | 100       | r                  | α              | 10/ 5/28             | 22.2                | 36.4             | 8.10 30              |
| 33             | 197A        | 0         | r                  |                | 10/ 8/28             | 28.5                | 35.6             | 8.23 4               |
| 34<br>34       | 200<br>201  | 0<br>100  | oe<br>r            | n<br>n         | 10/ 9/28<br>10/ 9/28 | 28.5<br>20.5        | 35.9<br>36.6     | 8.28 2<br>8.16 16    |
| 35             | 205         | 100       | r                  | n              | 10/26/28             | 14.4                | 34.9             | 7.88 189             |
| 35-36          | 209         | 0         | r                  | n              | 10/27/28             | (27.4               | 29.7             | 8.31 15)             |
| 35-36          | 212         | 0         | r                  | n              | 10/28/28<br>10/30/28 | (27.0<br>26.5       | 30.7<br>31.6     | 8.27 16)<br>8.23 16  |
| 36<br>38       | 216<br>222  | 0         | r                  | p<br>n         | 11/ 3/28             | 26.5                | 32.9             | 8.33 20              |
| 40             | 232         | ŏ         | r                  | p              | 11/ 8/28             | 22.2                | 33.7             | 8.21 24              |
| 45             | 257         | 50        | r                  | n              | 11/19/28             | 22.4                | 35.2             | 8.13 46              |
| 45<br>47       | 258<br>266  | 100<br>0  | oc<br>r            | n<br>n         | 11/19/28<br>11/19/28 | 18.6<br>23.9        | 35.1<br>36.0     | 8.00 50<br>8.23 17   |
| 47             | 267         | 50        | r                  | 'n             | 11/23/28             | 23.8                | 36.0             | 8.23 20              |
| 47             | 268         | 100       | oc                 | n              | 11/23/28             | 22.7                | 36.2             | 8.23 20              |
| 48             | 271         | 0         | oc                 |                | 11/25/28<br>11/25/28 | 23.6<br>23.6        | 36.4<br>36.4     | 8.23 13<br>8.24 16   |
| 48<br>48       | 272<br>273  | 50<br>100 | r<br>oc            | n<br>n         | 11/25/28             | 22.7                | 36.3             | 8.26 16              |
| 48             | 274         | 0         | r                  | p              | 11/25/28             | 23.6                | 36.4             | 8.23 13              |
| 49             | 277         | 0         | r                  | n              | 11/27/28             | 23.4                | 36.2<br>36.1     | 8.27 13<br>8.26 13   |
| 49<br>49       | 278<br>279  | 50<br>100 | r                  | n<br>n         | 11/27/28<br>11/27/28 | 22.6<br>21.6        | 35.9             | 8.26 13              |
| 49a            | 283         | 0         | oc                 | n              | 11/28/28             | (23.2               | 36.0             | 8.23 13)             |
| 50             | 284         | 0         | oc                 | n              | 11/29/28             | 23.2                | 36.0             | 8.23 13              |
| 50             | 286         | 100       | r                  | n              | 11/29/28<br>11/29/28 | 20.5<br>23.2        | 35.7<br>36.0     | 8.22 13<br>8.23 13   |
| 50<br>50-51    | 287<br>290  | 0         | r<br>oc            | p<br>n         | 11/30/28             | (22.8               | 35.6             | 8.22 16)             |
| 50-51          | 291         | 0         | oc                 | n              | 11/30/28             | (22.8               | 35.6             | 8.22 16)             |
| 50-51          | 292         | 0         | oc                 | n              | 11/30/28             | (22.8<br>22.8       | 35.6<br>35.6     | 8.22 16)<br>8.22 16  |
| 51<br>51       | 293<br>294  | 0<br>50   | oc<br>oc           | n<br>n         | 12/ 1/28<br>12/ 1/28 | 20.5                | 35.6             | 8.22 17              |
| 51             | 295         | 100       | oc                 | n              | 12/ 1/28             | 20.0                | 35.6             | 8.22 17              |
| 51             | 296         | 0         | r                  | p              | 12/ 1/28             | 22.8                | 35.6             | 8.22 16              |
| 52             | 299         | 0         | oc                 | n              | 12/ 3/28<br>12/ 3/28 | 22.5<br>20.2        | 35.4<br>35.6     | 8.21 8<br>8.20 8     |
| 52<br>52       | 300<br>301  | 50<br>100 | oc<br>oc           | n<br>n         | 12/ 3/28             | 18.2                | 35.2             | 8.17 8               |
| 53             | 303         | 0         | oc                 | n              | 12/ 5/28             | 22.6                | 35.7             | 8.22 13              |
| 53             | 304         | 50        | oc                 | n              | 12/ 5/28<br>12/ 5/28 | 21.2<br>19.9        | 35.8<br>35.6     | 8.20 13<br>8.19 13   |
| 53<br>53       | 305<br>306  | 100       | oc<br>r            | n<br>p         | 12/ 5/28             | 22.6                | 35.7             | 8.22 13              |
| 53-54          | 307         | ő         | oc                 | n              | 12/ 6/28             | (23.0               | 35.6             | 8.22 11)             |
| 53-54          | 308         | 0         | oc                 | n              | 12/ 6/28             | (23.0               | 35.6             | 8.22 11)<br>8.22 11) |
| 53-54          | 310         | 0         | oc                 | n<br>n         | 12/10/28<br>12/10/28 | (23.0<br>(23.0      | 35.6<br>35.6     | 8.22 11)             |
| 53-54<br>53-54 | 311<br>312  | 0         | oc<br>r            | n              | 12/10/28             | (23.0               | 35.6             | 8.22 11)             |
| 53-54          | 313         | 0         | r                  | n              | 12/10/28             | (23.0               | 35.6             | 8.22 11)             |
| 53-54          | 316         | 0         | r                  | n              | 12/12/28             | (23.0<br>(23.0      | 35.6<br>35.6     | 8.22 11)<br>8.22 11) |
| 53-54          | 317<br>319  | 0         | oc                 | n<br>n         | 12/12/28<br>12/14/28 | 23.4                | 35.5             | 8.22 9               |
| 54<br>54       | 319         | 50        | oc                 | n              | 12/14/28             | 19.8                | 35.4             | 8.18 17              |
| 55             | 324         | 50        | oc                 | n              | 12/16/28             | 18.7                | 35.0             | 8.18 12              |
| 55             | 325         | 100       | oc                 | n              | 12/16/28             | 16.7<br>20.8        | <b>34.9 34.9</b> | 7.17 12<br>8.13 9    |
| 56<br>56       | 328<br>329  | 0<br>50   | oc<br>oc           | n<br>n         | 12/18/88<br>12/18/28 | 18.5                | 35.1             | 8.14 9               |
| 56             | 330         | 100       | oc                 | n              | 12/18/28             | 16.6                | 34.8             | 8.11 12              |
| 56             | 331         | 0         | ос                 | p              | 12/18/28             | 20.8                | 34.9             | 8.13 9<br>8.14 20)   |
| 56-57          | 334         | 0         | 00                 | n<br>n         | 12/19/28<br>12/20/28 | (19.0<br>19.0       | 34.5<br>34.5     | 8.14 20)<br>8.14 20  |
| 57             | 335         | 0         | oc                 | 11             | 12/20/20             | 10.0                | 02.0             |                      |

Table 53. Distributional and environmental records for Ceratium hexacanthum--Continued

| Station  | Sample      | Depth (m) | Relative abundance | Appa-<br>ratus | Date                 | Temperature<br>(°C) | Salinity<br>(o/oo) | pH n         | PO4<br>ng/m <sup>3</sup> |
|----------|-------------|-----------|--------------------|----------------|----------------------|---------------------|--------------------|--------------|--------------------------|
| 57       | 336         | 50        | ос                 | п              | 12/20/28             | 15.6                | 34.3               | 8.14         | 21                       |
| 57       | 337         | 100       | r                  | n              | 12/20/28<br>12/20/28 | 14.3<br>19.0        | 34.4<br>34.5       | 8.10<br>8.14 | 40<br>20                 |
| 57<br>62 | 338<br>372  | 0<br>50   | oc<br>oc           | p<br>n         | 12/20/28             | 16.2                | 34.3               | 8.10         | 28                       |
| 62       | 373         | 100       | r                  | n              | 12/30/28             | 13.1                | 34.2               | 8.06         | 48                       |
| 62       | 375         | 50        | r                  | p              | 12/30/28             | 16.2                | 34.3               | 8.10         | 28<br>21                 |
| 63       | 379         | 0         | r                  | n              | 1/ 1/29 1/ 1/29      | 20.5<br>17.0        | 34.6<br>34.6       | 8.07<br>8.08 | 25                       |
| 63<br>64 | 380<br>396  | 50<br>100 | oc<br>r            | n<br>n         | 1/ 3/29              | 15.8                | 34.5               | 8.10         | 32<br>25                 |
| 65       | 409         | 50        | r                  | p              | 1/ 5/29              | 16.5                | 34.5               | 8.10         | 25                       |
| 66       | 412         | 100       | r                  | n              | 1/ 7/29              | 17.8<br>17.8        | 34.9<br>34.8       | 8.12<br>8.10 | 21<br>29                 |
| 66<br>66 | 414<br>415  | 50<br>100 | r                  | p<br>p         | 1/ 7/29<br>1/ 7/29   | 17.8                | 34.9               | 8.12         | 21                       |
| 67       | 416         | 0         | oc                 | n              | 1/ 8/29              | 19.3                | 34.9               | 8.11         | 21                       |
| 67       | 418         | 100       | r                  | n              | 1/ 8/29              | 16.2                | 34.6               | 8.05<br>8.12 | 40<br>62                 |
| 69       | 424         | 100       | oc                 | n<br>n         | 1/12/29<br>1/12/29   | 21.1<br>14.6        | 35.2<br>34.8       | 7.86         | 198                      |
| 69<br>71 | 426<br>439  | 100<br>50 | r                  | n              | 2/6/29               | 16.7                | 35.1               | 7.90         | 150                      |
| 73       | 452         | 100       | r                  | n              | 2/10/29              | 14.7                | 35.0               | 7.80         | 178                      |
| 75       | 462         | 0         | r                  | n              | 2/14/29              | 22.8<br>23.4        | 35.8<br>35.9       | 8.18<br>8.15 | 44<br>50                 |
| 76       | 467<br>472  | 0         | oc<br>oc           | n<br>n         | 2/16/29<br>2/18/29   | 23.7                | 36.0               | 8.19         | 16                       |
| 77<br>78 | 475         | ŏ         | .r                 | n              | 2/20/29              | 24.6                | 36.0               | 8.17         | 32                       |
| 78       | 476         | 50        | r                  | n              | 2/20/29              | 23.8                | 36.1               | 8.14         | 32<br>34                 |
| 78       | 477         | 100       | r                  | n              | 2/20/29<br>2/20/29   | 21.9<br>24.6        | 36.2<br>36.0       | 8.14<br>8.17 | 32                       |
| 78<br>79 | 478<br>482  | 0<br>50   | r                  | p<br>n         | 2/22/29              | 24.5                | 36.1               | 8.17         | 34                       |
| 79       | 483         | 100       | r                  | n              | 2/22/29              | 21.8                | 36.2               | 8.13         | 45                       |
| 80       | 486         | 0         | oc                 | n              | 2/24/29              | 26.0                | 35.9<br>35.9       | 8.20<br>8.20 | 36<br>36                 |
| 80       | 488         | 0         | r                  | p              | 2/24/29<br>2/26/29   | 26.0<br>26.5        | 35.8               | 8.19         | 38                       |
| 81<br>81 | 491<br>492  | 50        | oc<br>oc           | n<br>n         | 2/26/29              | 26.4                | 35.9               | 8.19         | 38                       |
| 82       | 496         | 0         | oc                 | n              | 2/28/29              | 27.2                | 36.3               | 8.21         | 34                       |
| 82       | 497         | 50        | oc                 | n              | 2/28/29              | 27.2<br>27.2        | 36.3<br>36.3       | 8.21<br>8.21 | 34<br>34                 |
| 82<br>83 | 498<br>501  | 0         | oc                 | p<br>n         | 2/28/29<br>3/ 2/29   | 27.5                | 36.3               | 8.24         | 29                       |
| 83       | 502         | 50        | oc                 | n              | 3/ 2/29              | 27.4                | 36.3               | 8.24         | 25                       |
| 83       | 503         | 0         | r                  | р              | 3/ 2/29              | 27.5                | 36.3<br>36.2       | 8.24<br>8.23 | 29<br>24                 |
| 84       | 505         | 0<br>0    | oc<br>r            | n              | 3/ 4/29<br>3/ 4/29   | 27.8<br>27.8        | 36.2               | 8.23         | 24                       |
| 84<br>85 | 507<br>510  | 0         | oc                 | p<br>n         | 3/6/29               | 27.9                | 36.2               | 8.22         | 40                       |
| 86       | 516         | 0         | r                  | n              | 3/ 9/29              | 28.3                | 36.2               | 8.29         | 20                       |
| 86       | 517         | 50        | oc                 | n              | 3/ 9/29              | 27.4<br>27.8        | 36.2<br>36.1       | 8.29<br>8.28 | 17<br>17                 |
| 87<br>87 | 521<br>522  | 0<br>50   | r                  | n<br>n         | 3/11/29<br>3/11/29   | 26.5                | 36.1               | 8.26         | 20                       |
| 88       | 526         | 0         | oc                 | n              | 3/21/29              | 28.5                | 35.9               | 8.23         | 16                       |
| 88       | 527         | 50        | r                  | n              | 3/21/29              | 28.4                | 35.9<br>35.6       | 8.25<br>8.25 | 13<br>21                 |
| 89       | 528         | 0<br>50   | oc<br>oc           | n<br>n         | 3/23/29<br>3/23/29   | 28.4<br>28.6        | 35.8               | 8.27         | 12                       |
| 89<br>89 | 529<br>532  | 0         | r                  | n              | 3/23/29              | (28.4               | 35.6               | 8.25         | 21)                      |
| 90       | 533         | 0 .       | ос                 | n              | 3/25/29              | 28.5                | 35.5               | 8.27         | 21                       |
| 90       | 534         | 50        | oc                 | n              | 3/25/29<br>3/25/29   | 28.6<br>28.5        | 35.6<br>35.5       | 8.26<br>8.27 | 21<br>21                 |
| 90<br>90 | 535<br>536  | 0<br>50   | r                  | p<br>p         | 3/25/29              | 28.6                | 35.6               | 8.26         | 21                       |
| 91       | 540         | 0         | oc                 | n              | 3/27/29              | 28.7                | 35.1               | 8.30         | 21                       |
| 91       | 541         | 50        | oc                 | n              | 3/27/29<br>3/29/29   | 28.5<br>28.5        | 35.2<br>35.3       | 8.30<br>8.29 | 24<br>28                 |
| 92<br>92 | 545<br>546  | 0<br>50   | oc oc              | n<br>n         | 3/29/29              | 28.4                | 35.4               | 8.29         | 28                       |
| 93       | 551         | 50        | 00                 | n              | 3/31/29              | 28.5                | 34.8               | 8.30         | 28                       |
| 94       | 558         | 50        | r                  | 'n             | 4/22/29              | 29.3                | 34.7<br>35.6       | 8.25<br>8.21 | 14<br>25                 |
| 94       | <b>55</b> 9 | 100       | r                  | n<br>n         | 4/22/29<br>4/26/29   |                     | 35.3               | 8.23         | 12                       |
| 96<br>96 | 568<br>569  | 50        | r                  | n              | 4/26/29              | 29.2                | 35.3               | 8.23         | 12                       |
| 96       | 570         | 100       | oc                 | n              | 4/26/29              | 28.2                | 35.7               | 8.19<br>8.16 | 25<br>24                 |
| 97       | 574         | 0         | oc                 | n              | 4/28/29<br>4/28/29   |                     | 35.2<br>35.4       | 8.16         | 21                       |
| 97<br>97 | 575<br>576  | 50<br>100 | oc<br>r            | n<br>n         | 4/28/29              |                     | 35.6               | 8.15         | 25                       |
| 98       | 581         | 0         | oc                 | n              | 4/30/29              | 27.0                | 35.3               | 8.16         | 24                       |
| 98       | 584         | 0         | r                  | p              | 4/30/29              |                     | 35.3<br>35.3       | 8.16<br>8.16 | 24<br>28                 |
| 98       | 585         | 50        | r                  | p<br>n         | 4/30/29<br>5/ 2/29   |                     | 34.9               | 8.21         | 12                       |
| 99       | 589<br>590  | 0<br>50   | oc<br>c            | n              | 5/ 2/29              | 27.8                | 34.9               | 8.22         | 12                       |
| 99       | 591         | 100       | С                  | n              | 5/ 2/29              | 27.8                | 35.0               | 8.22         | 17                       |
| 99       | 595         | 0         | c                  | n              | 5/ 2/29<br>5/ 4/29   | 27.9<br>27.6        | 34.9<br>34.7       | 8.21<br>8.21 | 12<br>10                 |
| 100      | 596<br>597  | 50<br>100 | c<br>c             | n<br>n         | 5/ 4/29              |                     | 34.7               | 8.22         | 12                       |
| 100      | 221         | 100       |                    | **             | -, -,                |                     |                    |              |                          |

Table 53. Distributional and environmental records for Ceratium hexacanthum--Continued

|                   |            | Depth     | Relative  | Appa-  | ecorus for           | Temperature  | Salinity     |              | DO:                   |
|-------------------|------------|-----------|-----------|--------|----------------------|--------------|--------------|--------------|-----------------------|
| Station           | Sample     | (m)       | abundance | ratus  | Date                 | (°C)         | (0/00)       | pН           | mg/m                  |
| 100               | 598        | 0         | r         | р      | 5/ 4/29              | 27.7         | 34.7         | 8.21         | 10                    |
| 100               | 599        | 50        | r         | p      | 5/ 4/29              | 27.6         | 34.7         | 8.21         | 10                    |
| 101               | 603        | 0         | С         | n      | 5/ 7/29              | 26.3         | 34.7         | 8.24         | 8                     |
| 101               | 604        | 50        | С         | n      | 5/ 7/29              | 26.2         | 34.7         | 8.24         | 8                     |
| 101<br>101        | 605<br>606 | 100<br>0  | r         | n      | 5/ 7/29<br>5/ 7/29   | 25.2<br>26.3 | 35.1<br>34.7 | 8.23<br>8.24 | 8                     |
| 101               | 607        | 50        | r         | p      | 5/ 7/29              | 26.2         | 34.7         | 8.24         | 8                     |
| 102               | 609        | ő         | ċ         | p<br>n | 5/ 9/29              | 25.8         | 35.0         | 8.24         | 8                     |
| 102               | 610        | 50        | oc        | n      | 5/ 9/29              | 25.8         | 35.0         | 8.24         | 8                     |
| 102               | 611        | 100       | r         | n      | 9/ 9/29              | 25.6         | 35.0         | 8.23         | 8                     |
| 102               | 612        | 0         | r         | p      | 5/ 9/29              | 25.8         | 35.0         | 8.24         | 8                     |
| 102               | 613        | 50        | r         | p      | 5/ 9/29              | 25.8         | 35.0         | 8.24         | 8885555557            |
| 102               | 614        | 100<br>0  | r         | p      | 5/ 9/29              | 25.6         | 35.0         | 8.23         | 8                     |
| 103<br>103        | 615<br>616 | 50        | c         | n<br>n | 5/11/29<br>5/11/29   | 26.0<br>25.8 | 35.0<br>35.2 | 8.25<br>8.25 | 5                     |
| 103               | 617        | 100       | oc<br>oc  | n      | 5/11/29              | 24.8         | 35.2         | 8.25         | 5                     |
| 103               | 618        | 0         | r         | p      | 5/11/29              | 26.0         | 35.0         | 8.25         | 5                     |
| 103               | 619        | 50        | r         | p      | 5/11/29              | 25.8         | 35.2         | 8.25         | 5                     |
| 104               | 621        | 0         | С         | 'n     | 5/13/29              | 26.1         | 35.2         | 8.24         | 7                     |
| 104               | 622        | 50        | С         | n      | 5/13/29              | <b>25.</b> 8 | 35.2         | 8.24         | 7                     |
| 104               | 623        | 100       | r         | n      | 5/13/29              | 25.3         | 35.3         | 8.21         | 7                     |
| 105               | 627        | 50        | С         | n      | 5/15/29              | 26.8         | 34.9         | 8.23         | 5                     |
| 105<br>105        | 628<br>629 | 50<br>100 | oc        | n      | 5/15/29<br>5/15/29   | 26.8<br>25.2 | 34.9<br>35.1 | 8.23<br>8.23 | 755555555554          |
| 105               | 630        | 0         | oc<br>r   | n      | 5/15/29              | 26.9         | 34.9         | 8.23         | 5                     |
| 106               | 633        | ŏ         | c         | p<br>n | 5/17/29              | 27.2         | 35.0         | 8.23         | 5                     |
| 106               | 634        | 50        | c         | n      | 5/17/29              | 27.0         | 35.0         | 8.23         | 5                     |
| 106               | 635        | 100       | c         | n      | 5/17/29              | 25.6         | 35.1         | 8.23         | 5                     |
| 106               | 636        | 0         | r         | p      | 5/17/29              | 27.2         | 35.0         | 8.23         | 5                     |
| 106               | 637        | 50        | r         | p      | 5/17/29              | 27.0         | 35.0         | 8.23         | 5                     |
| 107               | 639        | 0         | OE        | n      | 5/19/29              | 28.0         | 34.4         | 8.23         | 5                     |
| 107               | 640        | 50        | С         | n      | 5/19/29              | <b>27</b> .9 | 34.4         | 8.23         |                       |
| 107               | 641        | 100       | С         | n      | 5/19/29              | 26.8         | 34.9         | 8.23         | 11                    |
| 108<br>108        | 646<br>647 | 0<br>50   | oc        | n      | 5/27/29<br>5/27/29   | 28.4<br>26.8 | 35.0<br>35.0 | 8.25<br>8.24 | 4                     |
| 108               | 648        | 100       | oc<br>c   | n<br>n | 5/27/29              | 25.2         | 35.0         | 8.23         | 4                     |
| Guam              | 652        | 0         | r         | n      | 5/ /29               | 20.2         |              | 0.20         |                       |
| 109               | 654        | Ö         | r         | n      | 5/29/29              | 27.4         | 35.0         | 8.23         | 3<br>3<br>7<br>7      |
| 109               | 655        | 50        | r         | n      | 5/29/29              | 23.1         | 35.0         | 8.22         | 3                     |
| 112               | 674        | 0         | r         | n      | 6/ 5/29              | 23.2         | 34.6         | 8.22         | 7                     |
| 112               | 675        | 50        | oc        | n      | 6/ 5/29              | 21.7         | 34.6         | 8.23         | 7                     |
| 112               | 676        | 100       | r         | n      | 6/ 5/29              | 19.8         | 34.7         | 8.20         | 8                     |
| 113<br>113        | 680<br>681 | 0<br>50   | r         | n      | 6/25/29<br>6/25/29   | 24.2<br>23.8 | 34.5<br>34.6 | 8.25<br>8.25 | 5                     |
| 113               | 682        | 100       | oc<br>r   | n<br>n | 6/25/29              | 21.5         | 34.7         | 8.23         | 8                     |
| 113               | 684        | 50        | r         | p      | 6/25/29              | 23.8         | 34.6         | 8.25         | 8<br>5<br>5<br>8<br>5 |
| 132               | 797        | ő         | r         | n      | 9/8/29               | 21.0         | 33.9         | 8.34         | 15                    |
| 132               | 798        | 50        | oc        | n      | 9/8/29               | 17.6         | 33.9         | 8.33         | 19                    |
| 132               | 799        | 100       | oc        | n      | 9/8/29               | 14.3         | 33.4         | 8.30         | 16                    |
| 133               | 804        | 0         | r         | n      | 9/10/29              | 22.7         | 34.7         | 8.47         | 7                     |
| 133               | 805        | 50        | r         | n      | 9/10/29              | 20.8         | 34.7         | 8.37         | 7                     |
| 133               | 813        | 50        | r         | p      | 9/10/29              | 20.8         | 34.7         | 8.37         | 7.7                   |
| 133<br>135        | 814<br>820 | 100       | r         | p      | 9/10/29<br>9/14/29   | 18.4<br>23.8 | 34.8<br>35.1 | 8.31<br>8.37 | 7                     |
| 135               | 822        | 100       | r         | n<br>n | 9/14/29              | 18.7         | 34.8         | 8.34         | 5                     |
| 135               | 824        | 0         | r         | p      | 9/14/29              | 23.8         | 35.1         | 8.37         | 7                     |
| 135               | 825        | 50        | r         | p      | 9/14/29              | 21.5         | 35.0         | 8.37         | 5                     |
| 136               | 827        | 0         | oc        | 'n     | 9/16/29              | 24.6         | 35.4         | 8.37         | 3                     |
| 136               | 828        | 50        | oc        | n      | 9/16/29              | 21.4         | 35.1         | 8.39         | 3                     |
| 136               | 829        | 100       | r         | n      | 9/16/29              | 18.6         | 35.0         | 8.39         | 3                     |
| 136               | 832        | 0         | oc        | p      | 9/16/29              | 24.6         | 35.4         | 8.37         | 3                     |
| 137               | 836        | 0         | oc        | n      | 9/18/29              | 25.5         | 35.0<br>35.1 | 8.39<br>8.34 | 4                     |
| 137<br>137        | 837<br>838 | 50<br>100 | oc        | n<br>n | 9/18/29<br>9/18/29   | 24.4<br>21.5 | 35.1         | 8.30         | 5                     |
| 138               | 843        | 0         | r<br>oc   | n      | 9/20/29              | 26.1         | 34.8         | 8.35         | 5                     |
| 138               | 844        | 50        | oc        | n      | 9/20/29              | 25.6         | 34.7         | 8.30         | 3                     |
| 138               | 845        | 100       | oc        | n      | 9/20/29              | 22.2         | 34.8         | 8.31         | 3                     |
| 138               | 847        | 0         | r         | p      | 9/20/29              | 26.1         | 34.8         | 8.35         | 5                     |
| 139               | 849        | Ō         | oc        | 'n     | 9/22/29              | 26.7         | 34.8         | 8.34         | 6                     |
| 130               | 850        | 50        | ос        | n      | 9/22/29              | 25.8         | 34.9         | 8.31         | 6                     |
| 139               | 851        | 100       | oc        | n      | 9/22/29              | 22.4         | 35.2         | 8.28         | 6                     |
| 140               | 856        | 0         | r         | n      | 10/ 3/29             | 26.9         | 35.0<br>35.0 | 8.42<br>8.39 | 53333445553356667777  |
|                   | 857        | 50        | oc        | n      | 10/ 3/29             | 26.9         |              |              | 1                     |
| 140               | 050        | 100       | 700       | 9%     |                      |              |              |              | - 1                   |
| 140<br>140<br>140 | 858<br>860 | 100       | r         | n<br>p | 10/ 3/29<br>10/ 3/29 | 25.5<br>26.9 | 35.0<br>35.0 | 8.34<br>8.42 | 7                     |

Table 53. Distributional and environmental records for Ceratium hexacanthum--Concluded

| 141   865   50   0c   n   10/5/29   24.8   35.3   8.34   5   142   872   0   r   n   10/7/29   24.1   34.8   8.33   5   142   873   50   r   n   10/7/29   24.1   34.8   8.33   5   142   874   100   r   n   10/7/29   21.8   34.8   8.30   5   142   874   100   r   n   10/7/29   16.6   34.4   8.27   7   7   142   876   0   r   p   10/7/29   16.6   34.4   8.33   5   142   879   100   r   p   10/7/29   16.6   34.4   8.33   5   142   879   100   r   p   10/7/29   16.6   34.4   8.33   5   143   881   0   r   n   10/9/29   22.4   34.4   8.30   6   144   886   0   0c   n   10/11/29   23.3   35.0   8.37   6   145   891   50   0c   n   10/13/29   18.7   34.3   8.34   6   8.29   6   145   892   100   r   n   10/13/29   22.3   34.6   8.29   6   145   892   100   r   n   10/13/29   22.3   34.6   8.29   6   146   898   0   c   n   10/13/29   22.3   34.6   8.29   6   146   897   50   0c   n   10/15/29   22.4   34.9   8.37   6   146   897   50   0c   n   10/15/29   22.4   34.9   8.37   6   146   898   100   0c   n   10/15/29   22.4   34.9   8.37   6   146   898   100   0c   n   10/15/29   22.4   34.9   8.30   6   7   146   901   50   r   p   10/15/29   22.4   34.9   8.30   6   7   146   901   50   r   p   10/15/29   22.4   34.9   8.30   6   7   147   904   50   r   n   10/15/29   23.1   35.3   8.29   5   147   904   50   r   n   10/15/29   23.1   35.3   8.29   5   147   908   50   r   n   10/19/29   23.0   35.0   8.29   5   148   911   50   c   n   10/17/29   23.1   35.3   8.29   5   148   911   50   c   n   10/19/29   23.0   35.0   8.29   5   148   911   50   c   n   10/19/29   23.0   35.0   8.29   5   148   911   50   c   n   10/19/29   23.0   35.0   8.34   6   149   922   100   0c   n   10/19/29   23.0   35.0   8.37   6   149   922   100   0c   n   10/19/29   23.0   35.0   8.37   6   149   922   100   0c   n   10/19/29   23.0   35.0   8.37   6   150   930   50   r   n   10/19/29   23.0   35.0   8.37   6   150   930   50   r   n   10/19/29   23.5   35.0   8.37   6   150   930   50   r   n   10/19/29   23.4   33.3   35.0   8 |         |        |       |           |       |             |             |          |           |                   |
|--|---------|--------|-------|-----------|-------|-------------|-------------|----------|-----------|-------------------|
| 141  | Station | Sample | Depth | Relative  |       | Date        | Temperature | Salinity | рН        | PO4               |
| 142       872       0       r       n       10/7/29       24.1       34.8       8.33       5         142       874       100       r       n       10/7/29       16.6       34.4       8.27       7         142       876       0       r       p       10/7/29       16.6       34.4       8.27       7         142       879       100       r       p       10/7/29       16.6       34.4       8.27       7         143       881       0       r       n       10/9/29       22.4       34.4       8.27       7         144       886       0       oc       n       10/11/29       22.3       34.6       8.29       6         145       891       50       oc       n       10/13/28       22.3       34.6       8.29       6         145       882       100       r       n       10/13/29       16.0       34.1       8.34       6         146       896       0       r       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7   |         |        | (m)   | abundance | ratus |             | ( C)        | (0/00)   |           | mg/m <sup>3</sup> |
| 142       872       0       r       n       10/7/29       24.1       34.8       8.33       5         142       874       100       r       n       10/7/29       16.6       34.4       8.27       7         142       876       0       r       p       10/7/29       16.6       34.4       8.27       7         142       879       100       r       p       10/7/29       16.6       34.4       8.27       7         143       881       0       r       n       10/9/29       22.4       34.4       8.27       7         144       886       0       oc       n       10/11/29       22.3       34.6       8.29       6         145       891       50       oc       n       10/13/28       22.3       34.6       8.29       6         145       882       100       r       n       10/13/29       16.0       34.1       8.34       6         146       896       0       r       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7   | 1.41    | 965    | 50    | OF        |       | 10 / 5 / 20 | 24.0        | 25.2     | 0 24      | =                 |
| 142       874       100       r       n       10/7/29       16.6       34.4       8.27       7         142       879       100       r       p       10/7/29       16.6       34.4       8.27       7         143       881       0       r       p       10/7/29       16.6       34.4       8.30       6         144       886       0       oc       n       10/11/29       23.3       35.0       8.37       6         145       8891       50       oc       n       10/13/29       18.7       34.3       8.34       6         145       892       100       r       n       10/13/29       18.7       34.3       8.34       6         146       896       0       r       n       10/13/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7<   |         |        |       |           |       |             |             |          | 0.34      | 5                 |
| 142       874       100       r       n       10/7/29       16.6       34.4       8.27       7         142       879       100       r       p       10/7/29       16.6       34.4       8.27       7         143       881       0       r       p       10/7/29       16.6       34.4       8.30       6         144       886       0       oc       n       10/11/29       23.3       35.0       8.37       6         145       8891       50       oc       n       10/13/29       18.7       34.3       8.34       6         145       892       100       r       n       10/13/29       18.7       34.3       8.34       6         146       896       0       r       n       10/13/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       19.7<   |         |        |       |           |       | 10/ 7/29    |             |          |           | 5                 |
| 1443 881 0 r n 10/9/29 22.4 34.4 8.30 6 1445 890 0 c n 10/11/29 23.3 35.0 8.37 6 1445 891 50 oc n 10/13/29 18.7 34.3 8.34 6 145 892 100 r n 10/13/29 16.0 34.1 8.31 6 145 893 0 r p 10/13/29 22.3 34.6 8.29 6 146 896 0 r n 10/15/29 22.4 34.9 8.37 6 146 897 50 oc n 10/15/29 22.4 34.9 8.30 6 146 898 100 oc n 10/15/29 22.4 34.9 8.30 6 146 898 100 oc n 10/15/29 22.4 34.9 8.30 6 146 901 50 r p 10/15/29 22.4 34.9 8.30 6 147 904 50 r n 10/15/29 23.1 35.3 8.29 5 147 905 100 oc n 10/15/29 23.1 35.3 8.29 5 147 908 50 r p 10/17/29 19.2 35.0 8.29 5 148 910 0 oc n 10/19/29 23.1 35.3 8.29 5 148 911 50 r n 10/19/29 23.1 35.3 8.29 5 148 911 50 r n 10/19/29 23.1 35.3 8.29 5 149 920 0 oc n 10/19/29 23.0 35.1   |         |        |       |           |       | 10/ 7/29    |             |          |           | 7                 |
| 1443 881 0 r n 10/9/29 22.4 34.4 8.30 6 1445 890 0 c n 10/11/29 23.3 35.0 8.37 6 1445 891 50 oc n 10/13/29 18.7 34.3 8.34 6 145 892 100 r n 10/13/29 16.0 34.1 8.31 6 145 893 0 r p 10/13/29 22.3 34.6 8.29 6 146 896 0 r n 10/15/29 22.4 34.9 8.37 6 146 897 50 oc n 10/15/29 22.4 34.9 8.30 6 146 898 100 oc n 10/15/29 22.4 34.9 8.30 6 146 898 100 oc n 10/15/29 22.4 34.9 8.30 6 146 901 50 r p 10/15/29 22.4 34.9 8.30 6 147 904 50 r n 10/15/29 23.1 35.3 8.29 5 147 905 100 oc n 10/15/29 23.1 35.3 8.29 5 147 908 50 r p 10/17/29 19.2 35.0 8.29 5 148 910 0 oc n 10/19/29 23.1 35.3 8.29 5 148 911 50 r n 10/19/29 23.1 35.3 8.29 5 148 911 50 r n 10/19/29 23.1 35.3 8.29 5 149 920 0 oc n 10/19/29 23.0 35.1   |         |        |       |           |       | 10/ 7/29    |             |          |           | 5                 |
| 1443 881 0 r n 10/9/29 22.4 34.4 8.30 6 1445 890 0 c n 10/11/29 23.3 35.0 8.37 6 1445 891 50 oc n 10/13/29 18.7 34.3 8.34 6 145 892 100 r n 10/13/29 16.0 34.1 8.31 6 145 893 0 r p 10/13/29 22.3 34.6 8.29 6 146 896 0 r n 10/15/29 22.4 34.9 8.37 6 146 897 50 oc n 10/15/29 22.4 34.9 8.30 6 146 898 100 oc n 10/15/29 22.4 34.9 8.30 6 146 898 100 oc n 10/15/29 22.4 34.9 8.30 6 146 901 50 r p 10/15/29 22.4 34.9 8.30 6 147 904 50 r n 10/15/29 23.1 35.3 8.29 5 147 905 100 oc n 10/15/29 23.1 35.3 8.29 5 147 908 50 r p 10/17/29 19.2 35.0 8.29 5 148 910 0 oc n 10/19/29 23.1 35.3 8.29 5 148 911 50 r n 10/19/29 23.1 35.3 8.29 5 148 911 50 r n 10/19/29 23.1 35.3 8.29 5 149 920 0 oc n 10/19/29 23.0 35.1   |         | 879    |       |           |       | 10/ 7/29    |             |          |           | 7                 |
| 144       886       0       oc       n       10/11/29       23.3       35.0       8.37       6         145       891       50       oc       n       10/13/29       18.7       34.3       8.34       6         145       892       100       r       n       10/13/29       18.7       34.3       8.34       6         146       896       0       r       n       10/13/29       22.3       34.6       8.29       6         146       896       0       r       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.37       6         146       898       100       oc       n       10/15/29       22.4       34.9       8.30       6         147       904       50       r       n       10/15/29       23.1       35.3       8.29       5         147       905       100       oc       n       10/17/29       19.2       35.0       8.29       5         147       908       50       r       n       10/17/29       19.2<   |         | 881    | 0     |           |       | 10/ 9/29    | 22.4        |          |           | 6                 |
| 145       890       0       c       n       10/13/29       22.3       34.6       8.29       6         145       892       100       r       n       10/13/29       16.0       34.1       8.31       6         145       893       0       r       n       10/13/29       22.3       34.6       8.29       6         146       896       0       r       n       10/13/29       22.4       34.9       8.30       6         146       897       50       oc       n       10/15/29       22.4       34.9       8.30       6         146       898       100       oc       n       10/15/29       21.4       34.9       8.30       6         147       904       50       r       p       10/15/29       22.4       34.9       8.30       6         147       905       100       oc       n       10/15/29       23.1       35.3       8.29       5         147       908       50       r       p       10/17/29       19.2       35.0       8.29       5         147       908       50       r       p       10/17/29       23.1 <td></td> <td></td> <td></td> <td>OC</td> <td>n</td> <td>10/11/29</td> <td></td> <td>35.0</td> <td></td> <td>6</td>   |         |        |       | OC        | n     | 10/11/29    |             | 35.0     |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       | c         | n     | 10/13/29    |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       |             |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       |             |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       |             |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       | 10/15/29    |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       | 10/15/29    |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       | 10/15/29    |             |          |           | 6                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       |             |             |          |           | 0                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       |             |             |          |           | 5                 |
| 148       910       0       oc       n       10/19/29       23.4       35.2           148       912       100       r       n       10/19/29       23.0       35.1           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.34       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       23.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         151       931       100       r       n       10/23/29       26.0       34.0           151       938       50       oc       n       10/26/29       18   |         |        |       |           |       | 10/17/29    |             |          |           | 5                 |
| 148       911       50       r       n       10/19/29       23.0       35.1           148       912       100       r       n       10/19/29       23.0       35.0           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.37       6         149       922       100       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       22.8       34.8       8.35       10         151       931       100       r       n       10/23/29       22.8       34.8       8.35       10         151       931       100       r       n       10/26/29       18.3       34.4           151       938       50       oc       n       10/26/29   |         |        |       |           |       | 10/19/29    |             |          | 0.23      |                   |
| 148       912       100       r       n       10/19/29       20.0       35.0           149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.37       6         149       922       100       oc       n       10/21/29       20.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         150       931       100       r       n       10/26/29       26.0       34.6       8.32       11         151       937       0       r       n       10/26/29       26.0       34.0           151       938       50       oc       n       10/26/29       12.5       34.6           151       939       100       r       n       10/26/29   |         |        |       |           |       | 10/19/29    |             |          | ••••      |                   |
| 149       920       0       oc       n       10/21/29       23.5       35.0       8.34       6         149       921       50       oc       n       10/21/29       23.3       35.0       8.37       6         149       922       100       oc       n       10/21/29       20.3       34.9       8.38       6         150       929       0       oc       n       10/23/29       25.6       34.7       8.39       7         150       930       50       r       n       10/23/29       19.6       34.8       8.35       10         150       931       100       r       n       10/23/29       19.6       34.6       8.32       11         151       937       0       r       n       10/26/29       19.6       34.6       8.32       11         151       938       50       oc       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       12.5       34.6           151       941       0       r       p       10/26/29       18   |         |        |       |           |       |             |             |          |           |                   |
| 149       921       50       oc       n       10/21/29       23.3       35.0       8.37       6         150       929       0       oc       n       10/21/29       20.3       34.9       8.38       6         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         150       931       100       r       n       10/23/29       19.6       34.8       8.35       10         151       937       0       r       n       10/26/29       19.6       34.6       8.32       11         151       938       50       oc       n       10/26/29       26.0       34.0           151       938       50       oc       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       18.3       34.4           151       941       0       r       p       10/26/29       18.3       34.4           151       942       50       r       p       10/26/29 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>10/21/29</td><td></td><td></td><td>8.34</td><td>6</td></t<>   |         |        |       |           |       | 10/21/29    |             |          | 8.34      | 6                 |
| 149       922       100       oc       n       10/21/29       20.3       34.9       8.38       6         150       930       50       r       n       10/23/29       25.6       34.7       8.39       7         150       931       100       r       n       10/23/29       19.6       34.6       8.32       11         151       937       0       r       n       10/26/29       26.0       34.0           151       938       50       oc       n       10/26/29       18.3       34.4           151       939       100       r       n       10/26/29       18.3       34.6           151       941       0       r       p       10/26/29       18.3       34.4           151       942       50       r       p       10/26/29       18.3       34.4           152       944       0       oc       n       10/27/29       18.3       34.4           152       945       50       oc       n       10/27/29  |         |        |       |           |       | 10/21/29    |             |          |           | 6                 |
| 150 930 50 r n 10/23/29 22.8 34.8 8.35 10 150 931 100 r n 10/23/29 19.6 34.6 8.32 11 151 937 0 r n 10/26/29 26.0 34.0 151 938 50 oc n 10/26/29 18.3 34.4 151 939 100 r n 10/26/29 12.5 34.6 151 941 0 r p 10/26/29 26.0 34.0 152 944 0 oc n 10/26/29 18.3 34.4 152 944 0 oc n 10/27/29 27.4 33.7 8.35 20 152 945 50 oc n 10/27/29 14.2 34.5 7.87 53 152 946 100 oc n 10/27/29 11.4 34.7 7.76 75 152 948 0 r p 10/27/29 27.4 33.7 8.35 20 152 949 50 oc n 10/27/29 11.4 34.7 7.76 75 153 951 0 oc n 10/27/29 27.4 33.7 8.35 20 154 949 50 oc n 10/27/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.49 7 155 965 0 oc n 11/2/29 27.8 34.9 8.30 30 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30 155 966 50 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.1 8.37 46 156 974 100 r n 11/4/29 27.6 35.1 8.37 46   |         |        |       |           |       | 10/21/29    |             |          |           | 6                 |
| 150 930 50 r n 10/23/29 12.8 34.8 8.35 10 150 931 100 r n 10/23/29 19.6 34.6 8.32 11 151 937 0 r n 10/26/29 26.0 34.0 151 938 50 oc n 10/26/29 18.3 34.4 151 939 100 r n 10/26/29 12.5 34.6 151 941 0 r p 10/26/29 12.5 34.6 151 942 50 r p 10/26/29 18.3 34.4 152 944 0 oc n 10/27/29 18.3 34.4 152 944 0 oc n 10/27/29 27.4 33.7 8.35 20 152 945 50 oc n 10/27/29 14.2 34.5 7.87 53 152 946 100 oc n 10/27/29 11.4 34.7 7.76 75 152 948 0 r p 10/27/29 11.4 34.7 7.76 75 152 949 50 oc p 10/27/29 27.4 33.7 8.35 20 152 949 50 oc n 10/27/29 27.4 33.7 8.35 20 153 951 0 oc n 10/27/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.47 7 155 966 50 oc n 11/2/29 27.8 34.9 8.30 30 155 966 50 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 oc n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.6 35.0 8.34 28 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28  |         |        |       |           |       | 10/23/29    |             |          |           | 7                 |
| 150     931     100     r     n     10/23/29     19.6     34.6     8.32     11       151     938     50     oc     n     10/26/29     18.3     34.4         151     939     100     r     n     10/26/29     12.5     34.6         151     941     0     r     p     10/26/29     26.0     34.0         151     942     50     r     p     10/26/29     18.3     34.4         152     944     0     oc     n     10/27/29     27.4     33.7     8.35     20       152     945     50     oc     n     10/27/29     14.2     34.5     7.87     53       152     946     100     oc     n     10/27/29     11.4     34.7     7.76     75       152     948     0     r     p     10/27/29     14.2     34.5     7.87     53       152     949     50     oc     p     10/27/29     27.4     33.7     8.35     20       152     949     50     oc     p     10/27/29     27.4     33.7     8.3  | 150     | 930    | 50    | r         | n     | 10/23/29    | 22.8        | 34.8     | 8.35      | 10                |
| 151 938 50 oc n 10/26/29 18.3 34.4 151 939 100 r n 10/26/29 12.5 34.6 151 941 0 r p 10/26/29 26.0 34.0 151 942 50 r p 10/26/29 18.3 34.4 152 944 0 oc n 10/27/29 27.4 33.7 8.35 20 152 945 50 oc n 10/27/29 14.2 34.5 7.87 53 152 946 100 oc n 10/27/29 11.4 34.7 7.76 75 152 948 0 r p 10/27/29 27.4 33.7 8.35 20 152 949 50 oc n 10/27/29 11.4 34.7 7.76 75 152 949 50 oc n 10/27/29 14.2 34.5 7.87 53 153 951 0 oc n 10/27/29 14.2 34.5 7.87 53 153 951 0 oc n 10/27/29 14.2 34.5 7.87 53 153 951 0 oc n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.2 8.47 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 154 959 50 r n 10/31/29 28.3 34.2 8.39 7 155 965 0 oc n 11/2/29 27.8 34.9 8.30 30 155 966 50 oc n 11/2/29 27.8 34.9 8.30 30 155 967 100 oc n 11/2/29 27.8 34.9 8.30 30 155 972 0 oc n 11/2/29 27.2 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 974 100 r n 11/4/29 27.6 35.1 8.37 46   |         |        |       | r         | n     | 10/23/29    |             |          | 8.32      | 11                |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       |             |             |          |           | ***               |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       |             |             |          |           | •••               |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       | 10/26/29    |             |          | ****      | •••               |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       | 10/26/29    |             |          | • • • • • | ***               |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       |             |             | 34.4     | 0.25      | 20                |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       | 10/21/28    |             | 34.5     |           |                   |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |         |        |       |           |       | 10/21/29    |             |          |           |                   |
| 152     949     50     oc     p     10/27/29     14.2     34.5     7.87     53       153     951     0     oc     n     10/29/29     28.1     34.2     8.47     7       153     952     50     r     n     10/29/29     28.1     34.4     8.39     7       154     958     0     r     n     10/31/29     28.3     34.2     8.39     7       154     959     50     r     n     10/31/29     28.2     34.2     8.40     7       155     965     0     oc     n     11/2/29     27.8     34.9     8.29     29       155     966     50     oc     n     11/2/29     27.7     34.9     8.30     30       155     967     100     oc     n     11/2/29     27.2     35.0     8.30     35       156     972     0     oc     n     11/4/29     27.6     35.0     8.34     28       156     973     50     r     n     11/4/29     27.0     35.1     8.37     46       156     974     100     r     n     11/4/29     26.4     35.1     8.30     48  |         |        |       |           |       | 10/27/29    |             |          |           | 20                |
| 153 951 0 oc n 10/29/29 28.1 34.2 8.47 7 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.0 8.34 28 156 974 100 r n 11/4/29 27.0 35.1 8.37 46   |         |        |       |           |       | 10/27/29    |             |          |           | 53                |
| 153 952 50 r n 10/29/29 28.1 34.4 8.39 7 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.1 8.37 46 156 974 100 r n 11/4/29 26.4 35.1 8.30 48  |         |        |       |           |       | 10/29/29    |             |          |           | 7                 |
| 154 958 0 r n 10/31/29 28.3 34.2 8.39 7 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.6 35.1 8.37 46 156 974 100 r n 11/4/29 26.4 35.1 8.37 48   |         |        |       |           |       | 10/29/29    |             |          |           | 7                 |
| 154 959 50 r n 10/31/29 28.2 34.2 8.40 7 155 965 0 oc n 11/2/29 27.8 34.9 8.29 29 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30 155 967 100 oc n 11/2/29 27.2 35.0 8.30 35 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28 156 973 50 r n 11/4/29 27.0 35.1 8.37 46 156 974 100 r n 11/4/29 26.4 35.1 8.30 48   | 154     | 958    | 0     |           |       | 10/31/29    | 28.3        | 34.2     | 8.39      | 7                 |
| 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.2 35.0 8.30 35<br>156 972 0 oc n 11/4/29 27.6 35.0 8.34 28<br>156 973 50 r n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 r n 11/4/29 26.4 35.1 8.30 48   |         |        |       | r         | n     | 10/31/29    | 28.2        |          |           | 7                 |
| 155 966 50 oc n 11/2/29 27.7 34.9 8.30 30<br>155 967 100 oc n 11/2/29 27.2 35.0 8.30 35<br>156 972 0 oc n 11/4/29 27.6 35.0 8.34 28<br>156 973 50 r n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 r n 11/4/29 26.4 35.1 8.30 48   |         |        |       |           |       | 11/ 2/29    |             |          |           | 29                |
| 156 972 0 oc n 11/4/29 27.6 35.0 8.34 28<br>156 973 50 r n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 r n 11/4/29 26.4 35.1 8.30 48  |         |        |       |           |       | 11/ 2/29    |             |          |           | 30                |
| 156 973 50 r n 11/4/29 27.0 35.1 8.37 46<br>156 974 100 r n 11/4/29 26.4 35.1 8.30 48  |         |        |       |           |       | 11/ 2/29    |             |          |           |                   |
| 156 974 100 r n 11/4/29 26.4 35.1 8.30 48  |         |        |       |           |       | 11/ 4/29    |             |          |           |                   |
|  |         |        |       |           |       | 11/ 4/29    |             |          |           |                   |
|  |         |        |       |           |       |             |             |          |           |                   |
|  |         |        |       |           | n     |             |             |          |           |                   |
| 157 979 50 oc n 11/6/29 27.1 35.2 8.32 60<br>157 980 100 r n 11/6/29 26.8 35.5 8.30 64   |         |        |       |           |       |             |             |          |           |                   |
| 158 983 0 oc n 11/8/29 28.2 35.6 8.34 36   |         |        |       |           |       |             |             |          |           |                   |
| 158 984 50 r n 11/8/29 28.2 35.6 8.39 50   |         |        |       |           |       | 11/ 8/29    |             |          |           |                   |
| 158 985 100 r n 11/8/29 27.6 35.9 8.39 48  |         |        |       |           |       | 11/ 8/29    |             |          |           |                   |
| 159 990 0 r n 11/11/29 28.6 35.7 8.37 15   |         |        |       |           |       |             |             |          |           | 15                |
| 159 991 50 r n 11/11/29 28.5 35.7 8.39 15  |         |        |       |           |       | 11/11/29    |             |          |           | 15                |
| 159 992 100 r n 11/11/29 28.0 35.7 8.37 23   |         | 992    |       |           |       |             |             | 35.7     | 8.37      | 23                |
| 160 1000 0 r n 11/13/29 28.6 35.6 8.37 12  | 160     | 1000   | 0     |           |       | 11/13/29    | 28.6        |          |           | 12                |
| 160 1002 50 r n 11/13/29 28.6 35.6 8.39 15   | 160     | 1002   | 50    | r         | n     | 11/13/29    | 28.6        | 35.6     | 8.39      | 15                |

Table 54. Distributional and environmental records for Ceratium reflexum

|         |        |       | · · · · · · · · · · · · · · · · · · · |       | ,        |             |          |      |                                 |
|---------|--------|-------|---------------------------------------|-------|----------|-------------|----------|------|---------------------------------|
| Station | Sample | Depth | Relative                              | Appa- | Date     | Temperature | Salinity | Нq   | PO <sub>4</sub>                 |
| Diation | Dample | (m)   | abundance                             | ratus | Date     | (°C)        | (0/00)   | pn   | mg/m3                           |
|         |        | =0    |                                       |       | - / /    |             |          |      |                                 |
| 19      | 121    | 50    | r                                     | p     | 8/20/28  | 25.2        | 37.1     | 8.27 | 5<br>5<br>5<br>5<br>5<br>5<br>5 |
| 19      | 123    | 50    | r                                     | n     | 8/20/28  | 25.2        | 37.1     | 8.27 | 5                               |
| 19      | 124    | 100   | r                                     | n     | 8/20/28  | 22.4        | 37.0     | 8.25 | 5                               |
| 20      | 126    | 50    | r                                     | p     | 8/22/28  | 25.8        | 36.6     | 8.26 | 3                               |
| 20      | 127    | 100   | r                                     | p     | 8/22/28  | 22.6        | 36.7     | 8.19 | 5                               |
| 20      | 128    | 0     | r                                     | n     | 8/22/28  | 26.0        | 36.6     | 8.37 | 5                               |
| 20      | 130    | 100   | oc                                    | n     | 8/22/28  | 22.6        | 36.7     | 8.19 | 5                               |
| 20-21   | 131    | 0     | r                                     | n     | 8/23/28  | (26.6       | 36.3     | 8.32 | 4)                              |
| 21      | 132    | 0     | r                                     | p     | 8/24/28  | 26.6        | 36.3     | 8.32 | 4                               |
| 21      | 137    | 100   | r                                     | n     | 8/24/28  | 21.0        | 36.8     | 8.20 | 7                               |
| 22      | 139    | 0     | r                                     | p     | 8/27/28  | 26.7        | 36.0     | 8.26 | 8                               |
| 22      | 143    | 50    | r                                     | n     | 8/27/28  | 24.5        | 36.2     | 8.21 | 9                               |
| 22      | 144    | 100   | r                                     | n     | 8/27/28  | 17.5        | 36.1     | 7.99 | 123                             |
| 23      | 149    | 50    | r                                     | n     | 8/29/28  | 20.9        | 36.0     | 8.14 | 13                              |
| 48      | 271    | 0     | r                                     | n     | 11/25/28 | 23.6        | 36.4     | 8.23 | 13                              |
| 48      | 273    | 100   | r                                     | n     | 11/25/28 | 22.7        | 36.3     | 8.26 | 16                              |
| 53      | 305    | 100   | r                                     | n     | 12/ 5/28 | 19.9        | 35.6     | 8.19 | 13                              |
| 87      | 522    | 50    | r                                     | n     | 3/11/29  | 26.5        | 36.1     | 8.26 | 20                              |
| 95      | 564    | 100   | r                                     | n     | 4/24/29  | 28.5        | 35.4     | 8.22 | 21                              |
| 95      | 567    | 100   | r                                     | p     | 4/24/29  | 28.5        | 35.4     | 8.22 | 21                              |
| 97      | 575    | 50    | Г                                     | n     | 4/28/29  | 28.0        | 35.4     | 8.16 | 21                              |
| 97      | 576    | 100   | oc                                    | n     | 4/28/29  | 27.6        | 35.6     | 8.15 | 25                              |
| 97      | 578    | 50    | r                                     | p     | 4/28/29  | 28.0        | 35.4     | 8.16 | 21                              |
| 99      | 591    | 100   | r                                     | n     | 5/ 2/29  | 27.8        | 35.0     | 8.22 | 17                              |
| 105     | 628    | 50    | С                                     | n     | 5/15/29  | 26.8        | 34.9     | 8.23 | 5                               |
| 106     | 633    | 0     | r                                     | n     | 5/17/29  | 27.2        | 35.0     | 8.23 | 5                               |
| 106     | 634    | 50    | r                                     | n     | 5/17/29  | 27.0        | 35.0     | 8.23 | 5<br>5<br>5<br>4                |
| 106     | 635    | 100   | r                                     | n     | 5/17/29  | 25.6        | 35.1     | 8.23 | 5                               |
| 107     | 639    | 0     | oc                                    | n     | 5/19/29  | 28.0        | 34.4     | 8.23 | 5                               |
| 107     | 640    | 50    | r                                     | n     | 5/19/29  | 27.7        | 34.4     | 8.23 |                                 |
| 107     | 641    | 100   | oc                                    | n     | 5/19/29  | 26.8        | 34.9     | 8.23 | 11                              |
| 107     | 642    | 0     | oc                                    | p     | 5/19/29  | 28.0        | 34.4     | 8.23 | 5                               |
| 108     | 648    | 100   | r                                     | n     | 5/27/29  | 25.2        | 35.0     | 8.23 | 4                               |
| Guam    | 652    | 0     | r                                     | n     | 5/ /29   | ****        |          |      | •••                             |
| 113     | 681    | 50    | r                                     | n     | 6/25/29  | 23.8        | 34.6     | 8.25 | 5                               |
| 140     | 856    | 0     | r                                     | n     | 10/ 3/29 | 26.9        | 35.0     | 8.42 | 7                               |
| 140     | 858    | 100   | r                                     | n     | 10/ 3/29 | 25.5        | 35.0     | 8.34 | 7                               |
| 150     | 930    | 50    | r                                     | n     | 10/23/29 | 22.8        | 34.8     | 8.35 | 10                              |
| 160     | 1002   | 50    | r                                     | n     | 11/13/29 | 28.6        | 35.6     | 8.39 | 15                              |
|         |        |       |                                       |       |          |             |          |      |                                 |

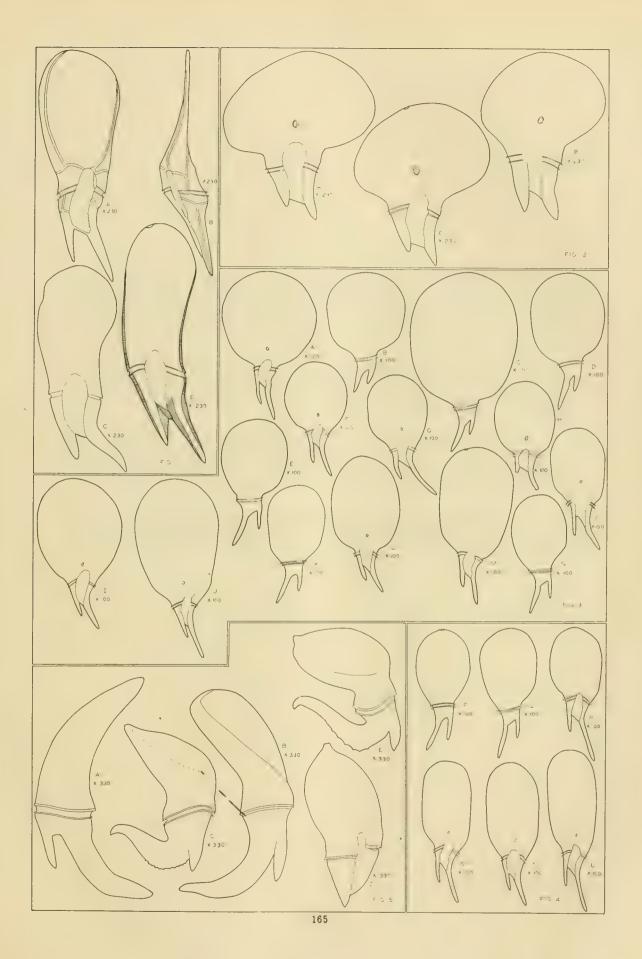


FIGURES 1 - 27

CHARTS 1 - 54

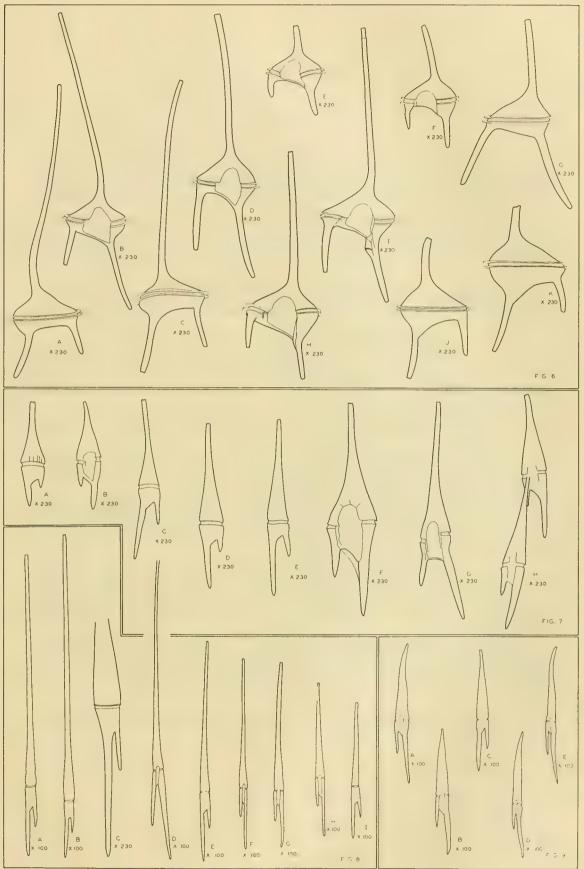
## FIGURES 1 - 5

- Fig. 1. <u>Ceratium praelongum</u> (Lem.) Kof. A, ventral view of specimen from station 31, Caribbean Sea; B, left lateral view of same; C, specimen from station 16, Sargasso Sea; D, heavy-walled individual from station 33, Caribbean Sea.
- Fig. 2. Ceratium cephalotum (Lemm.) Jörg. A, specimen from station 91, near Samoa; B, from station 132, off California; C, from station 1b, warm North Atlantic.
- Fig. 3. Variation in <u>C. gravidum</u> Gourret. A, from station 151, equatorial Pacific; B, from station 131, off California; C, from station 75, southeast Pacific; D, from station 149, east of Hawaii; E, from station 48, north of Easter Island; F, from station 107, near Guam; G, from station 91, near Samoa; H, from station 32, Caribbean Sea, showing autotomy of antapical horns; I, from station 81, east of Tuamotu Islands; J, from station 140, Hawaii; K, from station 19, Sargasso Sea; L, from station 97, near Phoenix Islands; M, from station 15, warm Atlantic; N, from station 26, Atlantic North Equatorial Current; O, from station 108, near Guam.
- Fig. 4. Variation in <u>C. gravidum</u> Gourret. P, from station 22, Atlantic North Equatorial Current; Q, from station 18, Sargasso Sea; R, from station 55, south of Easter Island; S, from station 99, north of Phoenix Islands; T, from station 37, Pacific Panama area; U, from station 81, east of Tuamotu Islands.
- Fig. 5. <u>Ceratium digitatum</u> Schütt. A, variety <u>rotundatum</u> Jörgensen from station 52, south of Easter Island; B, same from station 54, south of Easter Island; C, right lateral view of typical <u>C. digitatum</u> Schütt from station 25, Atlantic North Equatorial Current; D, ventral view of same specimen; E, specimen with unusually long left antapical horn from station 105, northeast of Guam.



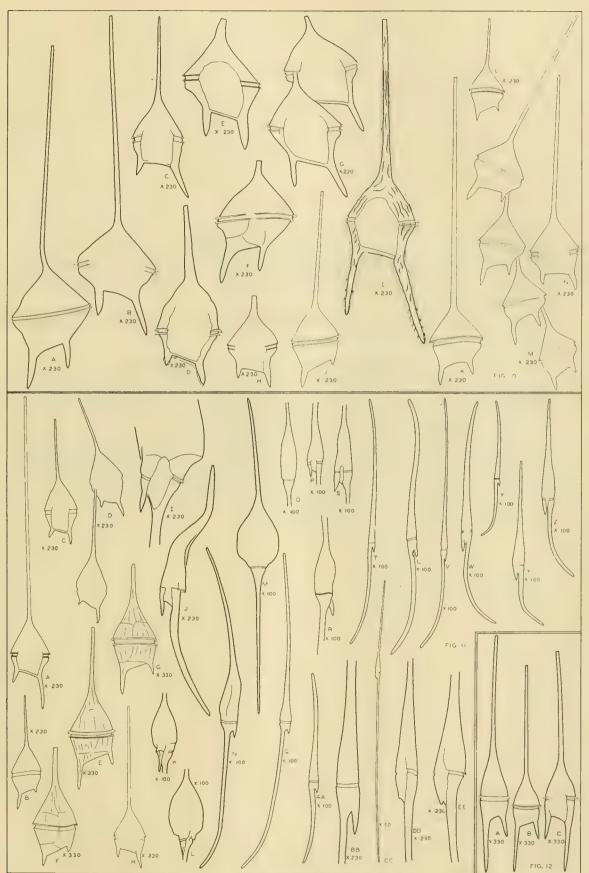
## FIGURES 6 - 9

- Fig. 6. Variation in <u>C. candelabrum</u> (Ehr.) Stein. A, specimen from station 87, near Tuamotu Islands; B, from station 83, near Tuamotu Islands; C, from station 91, near Samoa; D, from station 48, north of Easter Island; E, from station 97, near Phoenix Islands; F, from station 85, near Tuamotu Islands; G, from station 46, warm southeast Pacific; H, from station 1, Gulf Stream; I, from station 31, Caribbean Sea; J, from station 50, near Easter Island; K, from station 52, near Easter Island.
- Fig. 7. <u>Ceratium furca</u> (Ehr.) Dujardin. A, specimen from southeastern Pacific, station 79; B, from southeastern Pacific, station 50; C, from off Peru, station 71; D, from north of Hawaii, station 140; E, from southeastern Pacific, station 77; F, from southeast of Greenland, station 10; G, from southwest of Ireland, station 6; H, two-celled chain from station 73, southeastern Pacific.
- Fig. 8. <u>Ceratium belone</u> Cleve. A, specimen from station 49, north of Easter Island; B and C, specimen from station 100, east of Marshall Islands; D, station 53a, Easter Island; E, from station 81, east of Tuamotu Islands; F, from station 18, Sargasso Sea; G, from station 158, northeast of Samoa; H, from station 47, southeastern Pacific; I, from station 94, near Samoa.
- Fig. 9. <u>Ceratium incisum</u> (Karsten) Jörgensen. A, from station 99, north of Phoenix Islands; B, from station 95, north of Samoa; C, from station 158, northeast of Samoa; D, from station 103, north of Marshall Islands; E, from station 98, north of Phoenix Islands.



## FIGURES 10 - 12

- Fig. 10. A, B, E-G. <u>Ceratium subrobustum</u> (Jörg.) Nielsen. A, long-horned form with curved apical horn, from south of Easter Island, station 53; B, long-horned form from central Pacific, station 99; E, short-horned form from central North Atlantic, station 19; F, short-horned form from central Pacific, station 158; G, chain from central Pacific, station 97.
- H, K-N. <u>Ceratium pentagonum</u> subsp. <u>tenerum</u> (Jōrg.). H, short-horned form from the tropical Atlantic, station 24; K, long-horned form from the tropical North Atlantic, station 19; L, small form from southeastern Pacific, station 79; M, chain from Humboldt Current, station 73; N, long-horned form with curved antapical horns from off California, station 133.
- C, D, I, J. <u>Ceratium pentagonum</u> subsp. <u>pacificum</u> n. subsp. C, comparatively thinwalled individual from station 118; D, heavy-walled, short-horned form from station 123; I, large, long-horned form from station 122; J, thin-walled form from same sample as C.
  - Fig. 11. A, Ceratium setaceum Jörgensen, from station 110, north of Guam.
- B-D. <u>Ceratium teres</u> Kofoid. B, from station 101, northeast of Marshall Islands; C, from station 141, north of Hawaii; D, two-celled chain from station 85, Tuamotu Islands.
- E-G. <u>Ceratium lineatum</u> (Ehr.) Cleve. E, from station 6, off Ireland; F, specimen similar to <u>C. minutum</u> from station 10, southeast of Greenland; G, from station 11a southeast of Greenland.
  - H, Ceratium kofoidii Jörgensen from station 111, southeast of Japan.
- J, <u>Ceratium geniculatum</u> (Lemm.) Cleve. Partly separated. Specimen from station 45, southeast Pacific.
- I, K-N. <u>Ceratium bigelowii</u> Kofoid. I, enlarged ventral view of specimen shown in M, from station 47, southeast Pacific; K, specimen with little expanded body from station 154, central Pacific; L, latero-ventral view of specimen from station 158, central Pacific; M, dorsal view of specimen shown in I; N, right lateral view of same.
- O-S. <u>Ceratium inflatum</u> (Kofoid) Jörgensen. O, dorsal view of specimen from station 101, northeast of Marshall Islands; P, ventral view of specimen from station 20a, tropical Atlantic; Q, dorsal view of specimen from station 99, north of Phoenix Islands; R, right lateral view of specimen from station 101, northeast of Marshall Islands; S, ventral view of specimen from station 54, near Easter Island.
- T-V. <u>Ceratium longirostrum</u> Gourret. T, from station 145, central North Pacific; U, from station 98, north of Phoenix Islands; V, from station 103, north of Marshall Islands.
- W-AA. <u>Ceratium falcatum</u> (Kofoid) Jörgensen showing variation in size and curvature. W, from station 52, south of Easter Island; X, from station 158, northeast of Samoa; Y, from station 108, north of Guam; Z, from station 50, west of Easter Island; AA, from station 76, southeast Pacific.
- BB-DD. <u>Ceratium extensum</u> (Gourret) Cleve. BB, specimen with well-developed right antapical horn, (<u>C. strictum</u>) from station 81, tropical Pacific; CC, typical specimen without right antapical horn, from station 158, tropical Pacific; DD, enlargement of same specimen; EE, <u>Ceratium fusus</u> (Ehr.) Duj. Wide form from cold North Pacific region, station 123.
- Fig. 12. <u>Ceratium bōhmii</u> n. sp. A, from station 114, off Japan; B, from station 98, north of Phoenix Islands; C, from station 40, off Ecuador.



## FIGURES 13 and 14

Fig. 13. A-D. <u>Ceratium fusus</u> (Ehr.) Duj. A, enlarged dorsal view of specimen shown in D; B, specimen from warm Pacific, station 35; C, specimen from cold North Pacific region, station 123; D, specimen from cold Atlantic, station 11a.

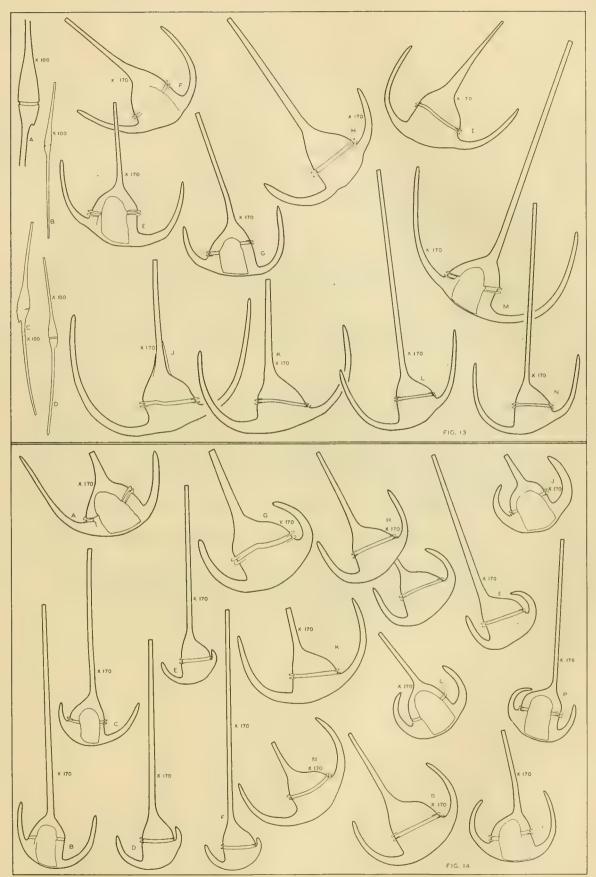
E-K. <u>Ceratium tripos</u> subsp. <u>atlanticum</u> (Ostenfeld). E, from station 39, off Ecuador; F, from station 61, southern part of southeast Pacific region; G, from station 118, northeast of Japan in cold North Pacific region; H, from station 43, region of Galapagos Islands; I, from station 6h, North Sea.

L-N. <u>Ceratium tripos</u> subsp. <u>semipulchellum</u> (Jörgensen). L, from station 68, southeast Pacific region; M, from station 46, southeastern part of warm Pacific region; N, from station 1, Gulf Stream of Atlantic.

Fig. 14. A, Ceratium humile Jörgensen, from station 1, Gulf Stream.

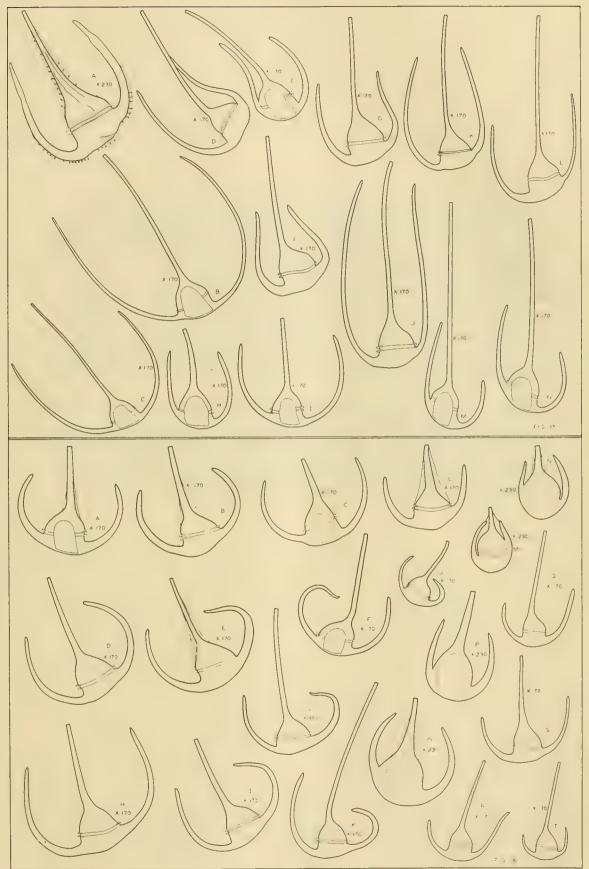
B-F. <u>Ceratium pulchellum Schröder</u>. B, long-horned form resembling <u>semipulchellum</u>, from station 15, warm Atlantic; C, wide form from station 63, southeast Pacific; D, typical form from station 138 northeast of Hawaii, warm Pacific; E, from station 19, warm Atlantic; F, from station 87, near Tuamotu Islands, warm Pacific.

G-P. Ceratium breve (Ostenfeld and Schmidt) Schröder. G, from station 41a, near Galapagos Islands; H, two-celled chain from station 35a, Panama region (shows a transition between the curvulum and parallelum types); I, form similar to C. schmidtii Jörgensen, from station 150, warm Pacific; J, specimen from station 91, intermediate between the schmidtii form and the typical breve; K, open form resembling C. arcuatum, from station 16, warm Atlantic; L, from station 105, western warm Pacific; M, from station 30, warm Atlantic; N, from station 24, warm Atlantic; O, from station 16, warm Atlantic; P, another specimen resembling C. schmidtii, from station 35, Panama region.



#### FIGURES 15 and 16

- Fig. 15. A, Ceratium compressum Gran from station 61, southeast Pacific.
- B-C. <u>Ceratium filicorne</u> Nielsen. B, from south of Easter Island, station 57; C, from near Samoa, station 93.
- D-E. <u>Ceratium axiale</u> Kofoid. D, from off Japan, station 112; E, from station 63, southeast Pacific region.
- F-G. <u>Ceratium aultii</u> n. sp. F, from station 72, off Peru; G, from station 151, eastern warm Pacific region.
- H-I. <u>Ceratium symmetricum</u> Pavillard. H, variety <u>orthoceros</u> Jörgensen, from station 43, north of Easter Island; I, variety <u>symmetricum</u> Pavillard, from station 153, eastern warm Pacific region.
- J-L. Variety <u>coarctatum</u> Pavillard. J, from station 67, southeast Pacific region; K, from station 153; L, from station 57, south of Easter Island.
- M-N. Ceratium euarcuatum Jörgensen. M, from station 16, warm Atlantic; N, from station 1b, warm Atlantic.
- Fig. 16. A-K. <u>Ceratium arietinum</u> Cleve. From station 130, off California. B, from station 73, off Peru (answers to southern form of <u>bucephalum</u> of Peters); C, from station 61, southern end of southeast Pacific region (also corresponds to southern form of <u>bucephalum</u>); D, from station 127, cold North Pacific (corresponds to Pacific northern form of <u>bucephalum</u>); E, specimen from same sample showing the more typical <u>arietinum</u> form; F, from station 46, eastern tropical Pacific (corresponds to subsp. <u>gracilentum</u> of the Atlantic); G, from station 148, between United States and Hawaii (small <u>arietinum</u> type); H, from station 6h, North Sea (corresponds to <u>C. bucephalum</u> of the North Atlantic); I, from station 130, off California; J, from station 110, between Japan and Guam; K, subspecies <u>gracilentum</u> of Atlantic, from station 22, North Equatorial Current.
- L, Ceratium petersii Nielsen. From station 61, southern end of southeast Pacific region.
- M-P. <u>Ceratium azoricum</u> Cleve. M, from station 44, west of Galapagos; N, from station 110, between Japan and Guam; O, from station 127, cold North Pacific; P, from station 6, off Ireland.
- Q-T. <u>Ceratium declinatum</u> Karsten. Q, variety <u>declinatum</u> from station 15, North Atlantic West Wind Drift; R, from station 67, southeast Pacific region (characteristic of southeast Pacific but found in other regions as well); S, variety <u>majus</u> from station 3, cold North Atlantic; T, variety <u>laticornum</u> from station 13a, cold Atlantic region.



#### FIGURES 17 and 18

Fig. 17. A-C. <u>Ceratium declinatum</u> Karsten. A, short-horned form of variety <u>angusticornum</u>, from station 37, Panama region of Pacific; B, long-horned form of var. angusticornum from the Pacific station 54: C. similar form from the Atlantic, station 18.

angusticornum from the Pacific, station 54; C, similar form from the Atlantic, station 18.

D-G. Ceratium gibberum Gourret. D, typical form of the species, from station 95, region of Samoa; E, chain of two cells, from station 48 north of Easter Island; F, form subaequale Jörgensen, from station 114, off Japan; G, variant of main species with elongated and nongibbous body, from off west coast of Panama, station 37.

H-I. <u>Ceratium concilians</u> Jörgensen. H, typical form from station 118, northeast of Japan; I, form with more regular horns corresponding to f. <u>subaequale</u> of C. <u>gibberum</u>,

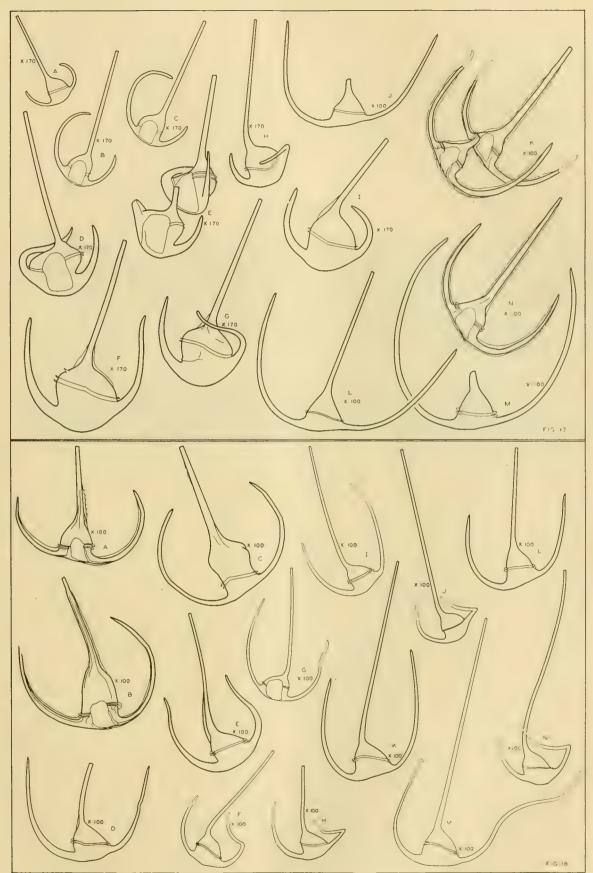
from station 130, off California.

J-N. <u>Ceratium lunula</u> Schimper. J, <u>brachyceros</u> form from Atlantic, station 1b; K, chain of two cells showing regeneration of antapical horns, from station 1b; L, <u>magaceros</u> form with widely spreading horns, from station 158, central tropical Pacific; M, <u>magaceros</u> form with extremely long antapical horns, from station 40, off Ecuador; N, heavy-walled magaceros form from Atlantic, station 2.

Fig. 18. A-C. Ceratium carnegiei n. sp. A, from station 158, northeast of Samoa.

B and C, from station 151, southeast of Hawaii.

D-N. Ceratium contortum Cleve. D, from station 148, between Hawaii and the United States; E, from station 88, near Tahiti; F, from station 1, Gulf Stream; G, from station 107, near Guam; H, from station 158, northeast of Samoa; I, from station 148, between Hawaii and the United States; J, from station 138, near Hawaii; K, from station 131, off California; L, from station 26, Atlantic North Equatorial Current; M, from station 103, north of the Marshall Islands; N, from station 52, southeast of Easter Island.



### FIGURES 19 and 21

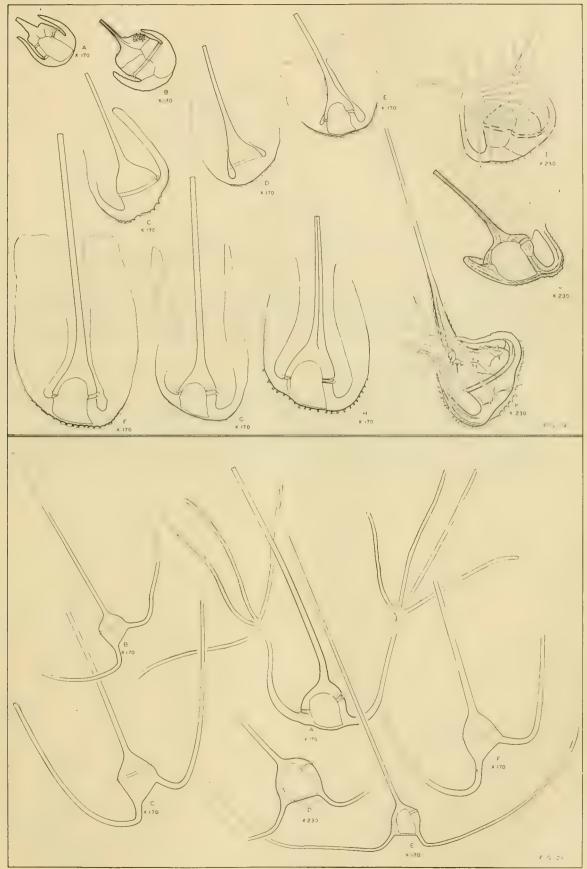
Fig. 19. A, <u>Ceratium limulus</u> Gourret from station 17, central North Atlantic; B, Ceratium paradoxides Cleve from station 25, Atlantic North Equatorial Current.

C-H. Ceratium platycorne Daday. C, from station 93, near Samoa; D and E, from station 25, North Equatorial Current, Atlantic; F, from station 41, between Galapagos Islands and Ecuador; G, from station 15, North Atlantic West Wind Drift; H, from station 1 off east coast of United States.

I-K. <u>Ceratium ranipes</u> Cleve. I, from station 47, north of Easter Island; J, from station 48, north of Easter Island (same specimen as in fig. 20); K, from station 30, east of the Caribbean Sea.

Fig. 21. A, <u>Ceratium ranipes</u> Cleve. From station 16, North Atlantic West Wind Drift.

B-F. Ceratium macroceros Cleve. B, subspecies gallicum, from station 139, near Hawaii; C, from station 61, southeastern Pacific, possibly the subantarctic subspecies; D, subspecies gallicum from station 128, off west coast of United States; E, same specimen as in D, lower magnification; F, subspecies macroceros from station 10, southeast of Greenland.



### FIGURES 20 and 22

Fig. 20. <u>Ceratium ranipes</u> Cleve with extreme number of "fingers" on antapical horns. From station 48, northof Easter Island. Full ventral view of this specimen is shown in fig. 19J.

Fig. 22. A, <u>Ceratium carriense</u> Gourret, from station 1, Gulf Stream; B, <u>Ceratium trichoceros</u> (Ehr.) Kofoid, from station 50, near Easter Island.

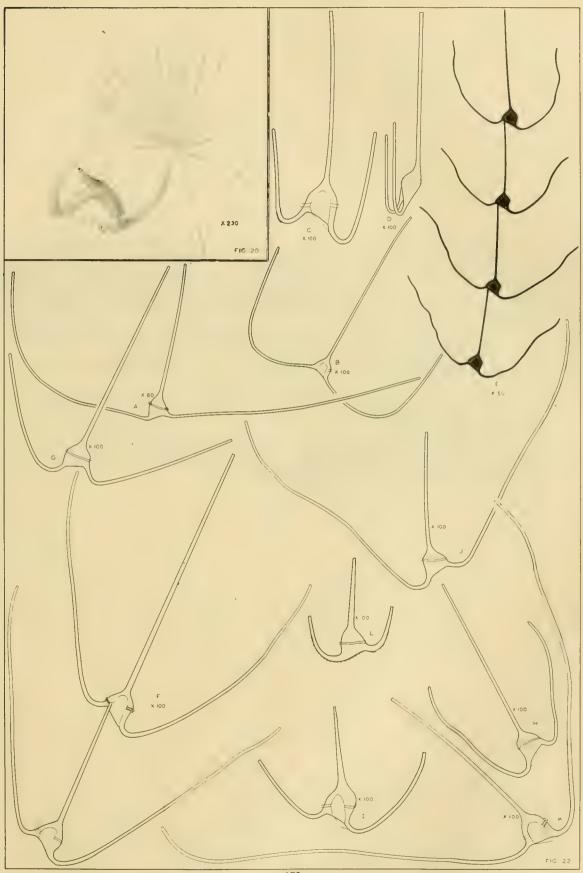
C-D. Ceratium deflexum Kofoid. C, ventral view of specimen from station 152, Pacific North Equatorial Current; D, right lateral view of same showing ventral curvature of antapical horns.

E. <u>Ceratium contrarium</u> (Gourret) Pavillard. Four-celled chain from station 52, near Easter Island.

F-L. <u>Ceratium massiliense</u> (Gourret) Jörgensen. E, four-celled chain of form diverging toward <u>C. contrarium</u>, from station 52, south of Easter Island; F, two-celled chain from station 152, Pacific North Equatorial Current; G, form with posteriorly extended posterior horns, from station 143, central North Pacific; H, form simulating <u>C. deflexum</u>, from station 18, Sargasso Sea; I, variety <u>protuberans</u> (Karsten) Jörgensen, from station 80, eastern tropical Pacific; J, variant from station 37, Pacific Panama region; K, variant

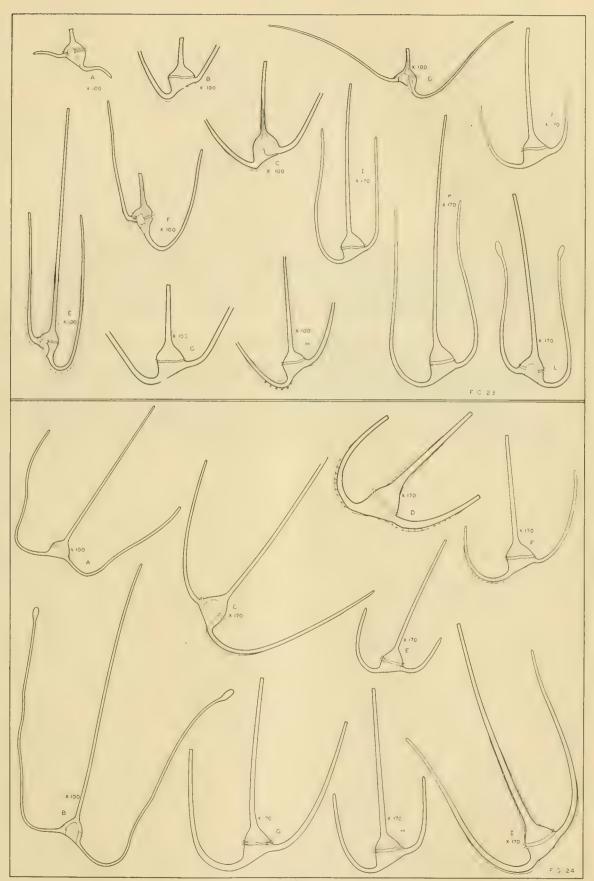
from station 85, near Tuamotu Islands; L, variety armatum (Karsten) Jörgensen, from sta-

tion 25, Atlantic North Equatorial Current.



### FIGURES 23 and 24

- Fig. 23. A-H. <u>Ceratium vultur</u> Cleve. A, variety <u>recurvum</u> Jörgensen from station 29, east of the Caribbean Sea; B, variety <u>reversum</u> n. var. from station 40, off Ecuador; C, variety <u>pavillardii</u> (Jörgensen) from station 132, between California and Hawaii; D, variety <u>sumatranum</u> (Karsten) from station 138, near Hawaii; E, variety <u>japonicum</u> (Schröder) from station 104, northeast of Guam; F, variety <u>japonicum</u> from station 153, central Pacific; G, variety <u>regulare</u> n. var. from station 47, north of Easter Island; H, variety <u>yultur</u> (Cleve) from station 156, central Pacific.
- I, K. <u>Ceratium horridum</u> var. <u>molle</u> (Kofoid) Jörgensen. I, from station 26, Atlantic North Equatorial Current; K, from station 130, off California.
- J, L. <u>Ceratium horridum</u> var. <u>claviger</u> (Kofoid). C, from station 1b, Gulf Stream; D, from station 96, between Samoa and Phoenix islands.
- Fig. 24. A-B. <u>Ceratium contrarium</u> (Gourret) Pavillard. A, from station 19, Sargasso Sea; B, <u>Ceratium contrarium</u> var. <u>claviceps</u> Schröder, from station 152, North Equatorial Current of Pacific.
- C-I. <u>Ceratium horridum</u> Gran. C, from station 151, Pacific North Equatorial Current; D, from station 8, cold North Atlantic; E, from station 35, Pacific Panama region; F, from station 126, south of Gulf of Alaska; G, from station 6f, cold North Atlantic; H, from station 1b, Gulf Stream; I, from station 114, off Japan.



## FIGURES 25 and 26

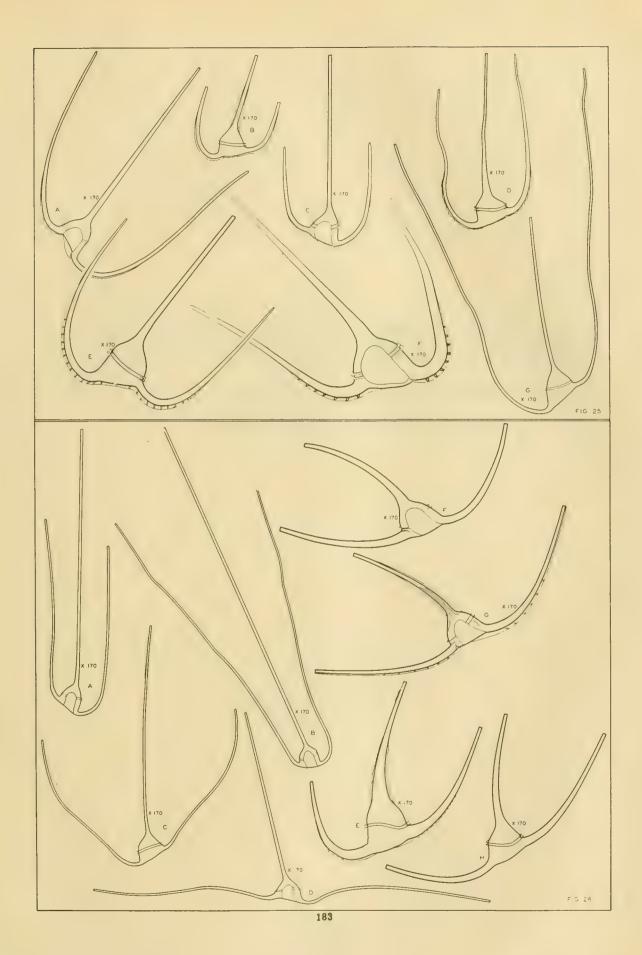
Fig. 25. A-C, E-G. <u>Ceratium horridum</u> Gran. A, from station 128, off west coast of United States; B, from station 41a, near Galapagos; C, from station 111, southeast of Japan; E, from station 61, cool southeast Pacific; F, from station 72, off Peru; G, from station 151, Pacific North Equatorial Current.

D, <u>Ceratium horridum</u> var. <u>molle</u> (Kofoid) Jörgensen, from station 3, North Atlantic West Wind Drift.

Fig. 26. A-B. <u>Ceratium longissimum</u> (Schröder) Kofoid. A, from the Atlantic, station 25; B, from the Pacific, station 80.

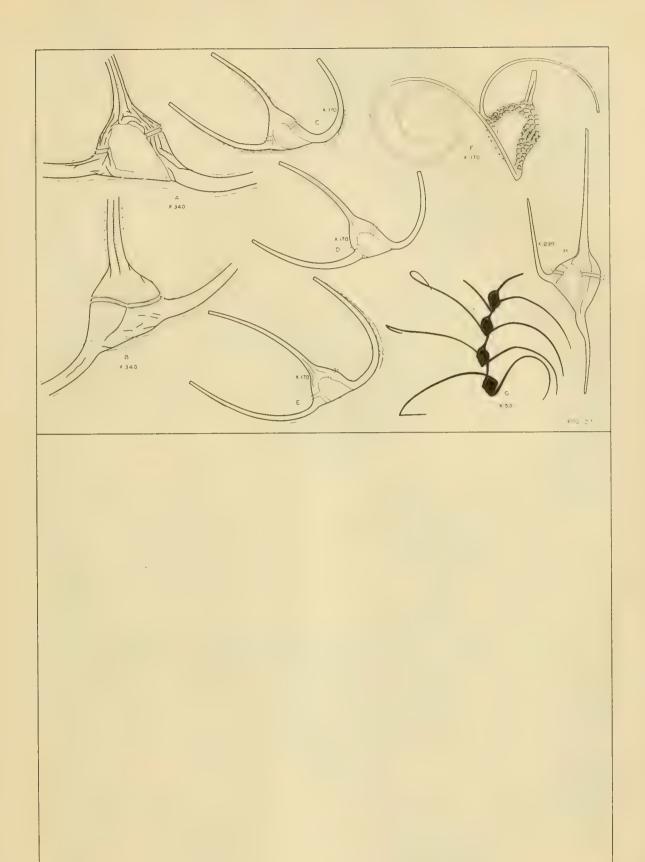
C-D. <u>Ceratium tenue</u> Ostenfeld and Schmidt. C, variety <u>inclinatum</u> (Kofoid) Jörgensen from station 30, east of Caribbean Sea; D, variety <u>tenuissimum</u> (Kofoid) Jörgensen from station 15, North Atlantic Drift.

E-H. <u>Ceratium arcticum</u> (Ehrenberg) Cleve. E, variety <u>ventricosum</u> Ostenfeld from station 11a, off Greenland; F, variety <u>arcticum</u> (Ehrenberg) Cleve from station 19, Sargasso Sea; G, same from station 146, between California and Hawaii; H, same from station 13, off Newfoundland.

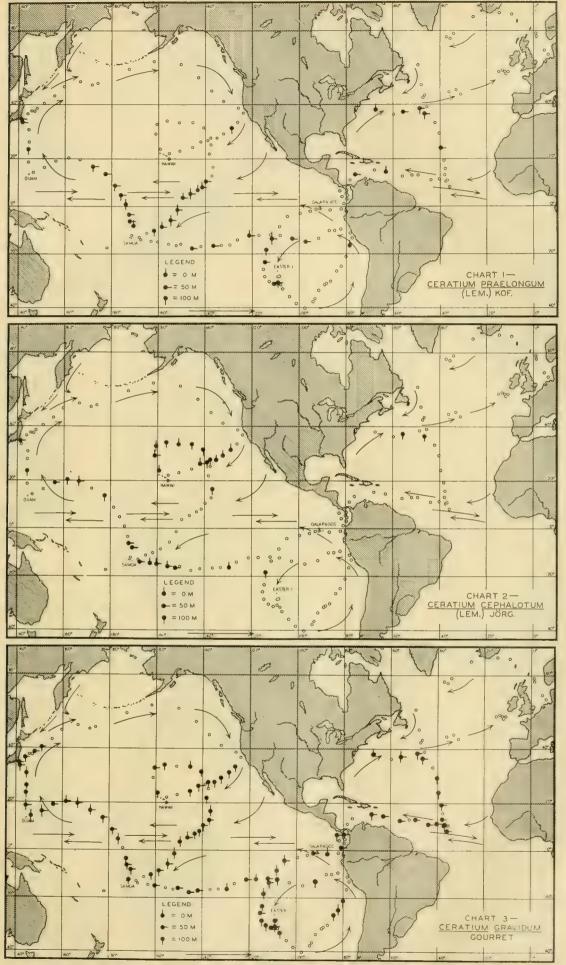


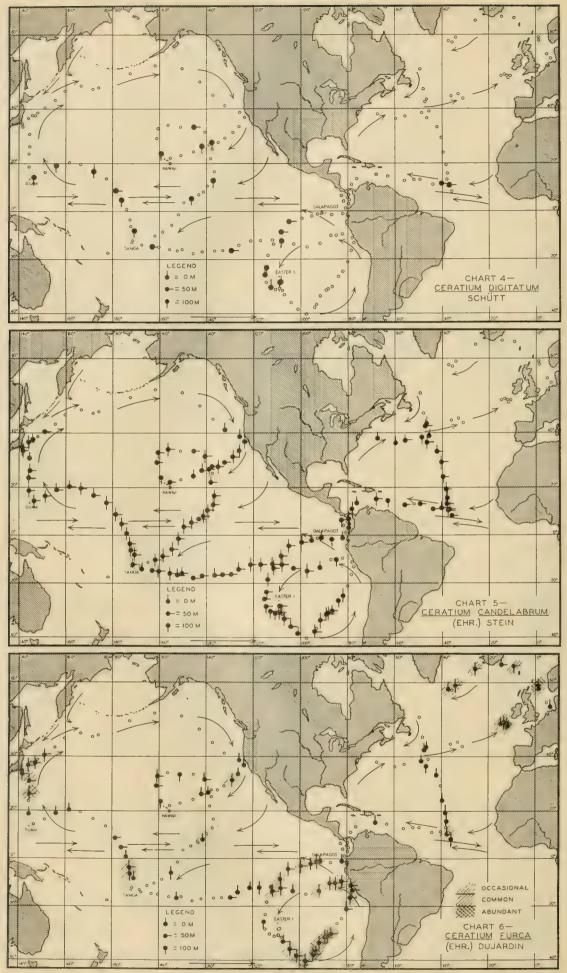
# FIGURE 27

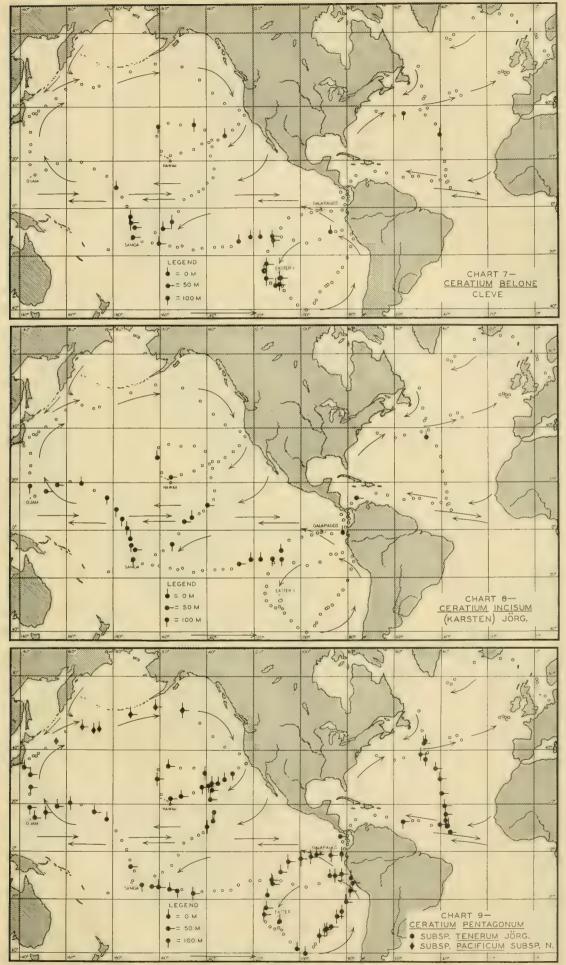
- Fig. 27. A-E. <u>Ceratium arcticum</u> (Ehrenberg) Cleve. A, variety <u>arcticum</u> from station 13, off Newfoundland (enlarged ventral view of body showing sutures); B, same specimen, dorsal view; C, variety <u>longipes</u> (Bailey) Gran from station 8, off Iceland; D, same from station 123, off Aleutian Islands; E, same from station 117, northeast of Japan.
- F-G. <u>Ceratium hexacanthum</u> Gourret. F, from station 50, near Easter Island; G, chain of four cells from station 103, north of Marshall Islands.
  - H, Ceratium reflexum Cleve, from station 108, north of Guam.

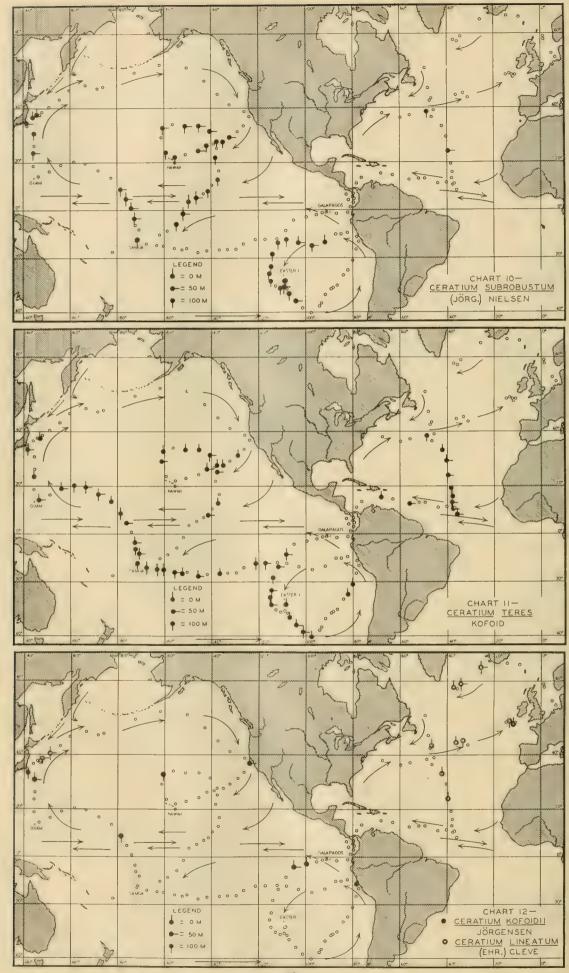


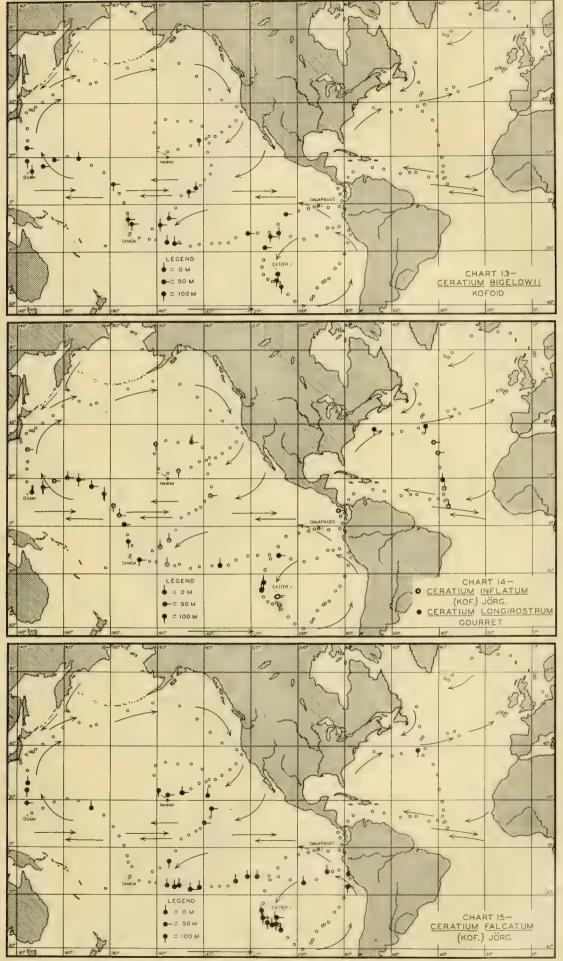


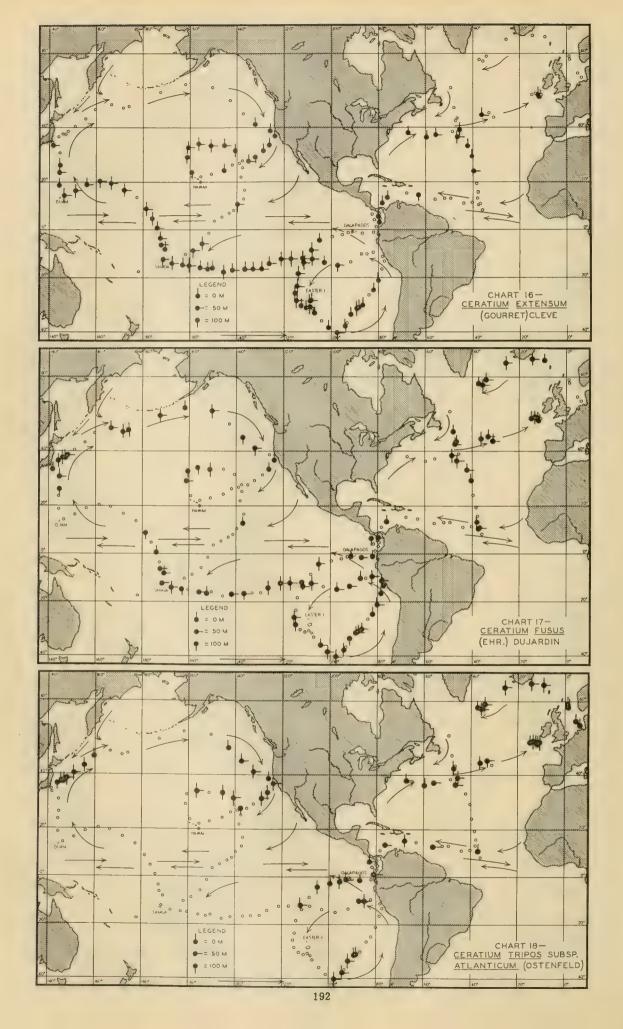


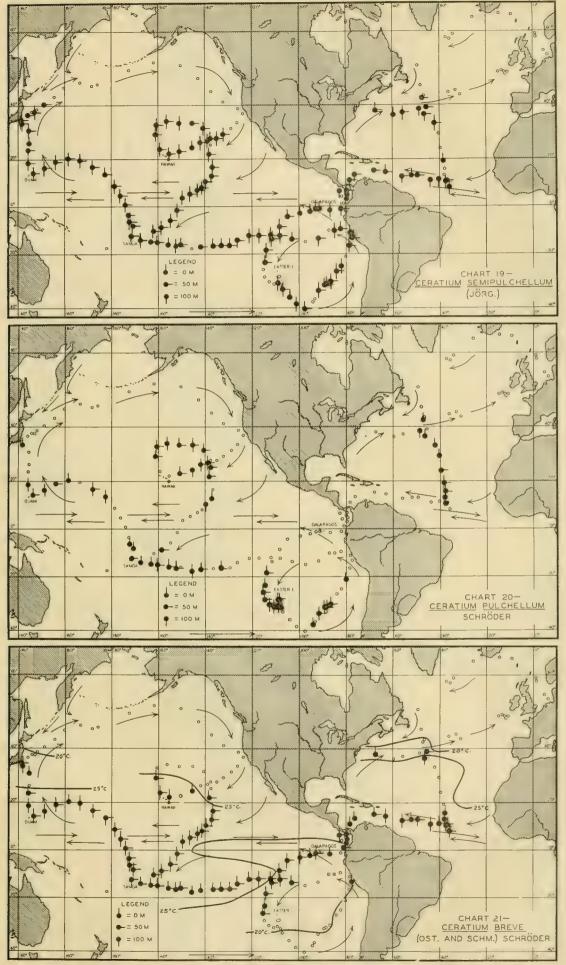


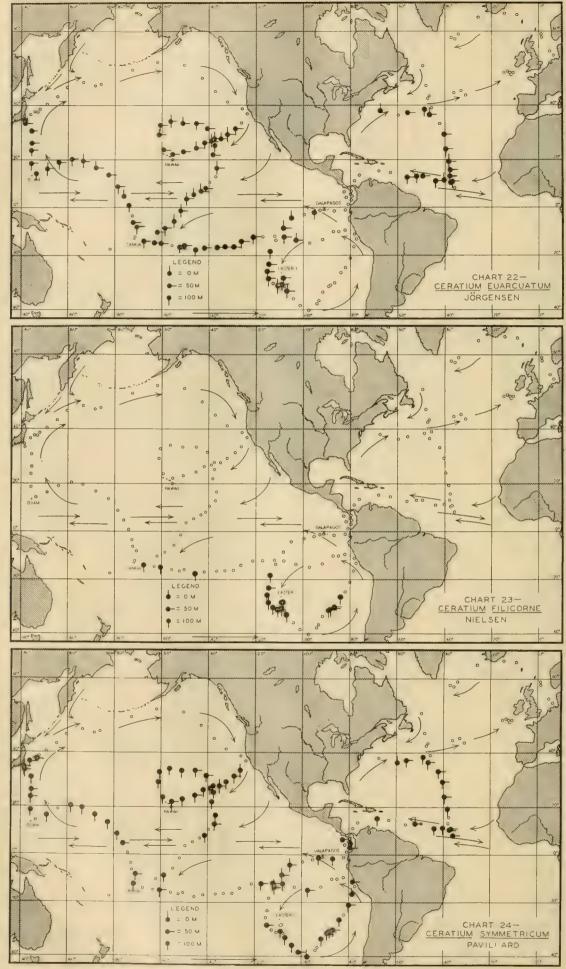


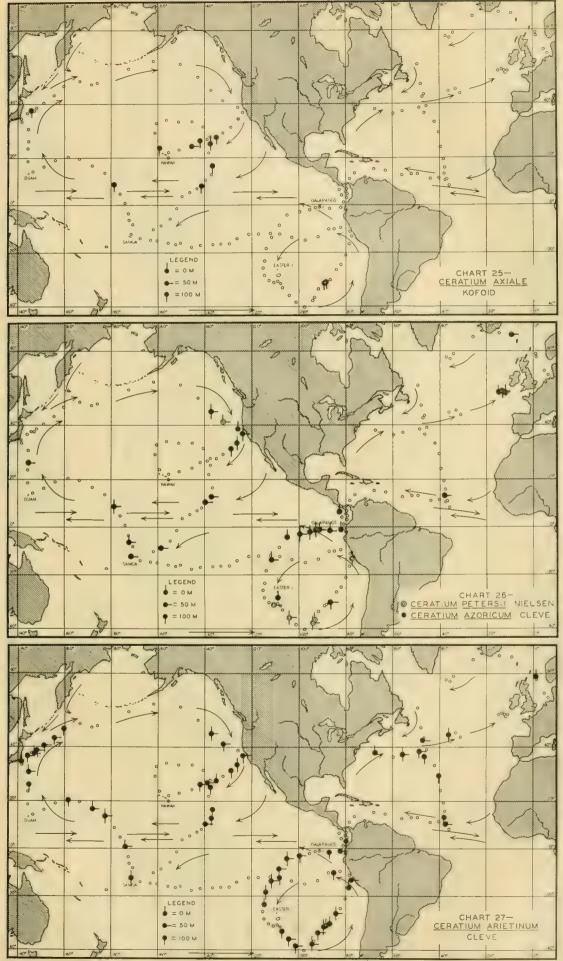


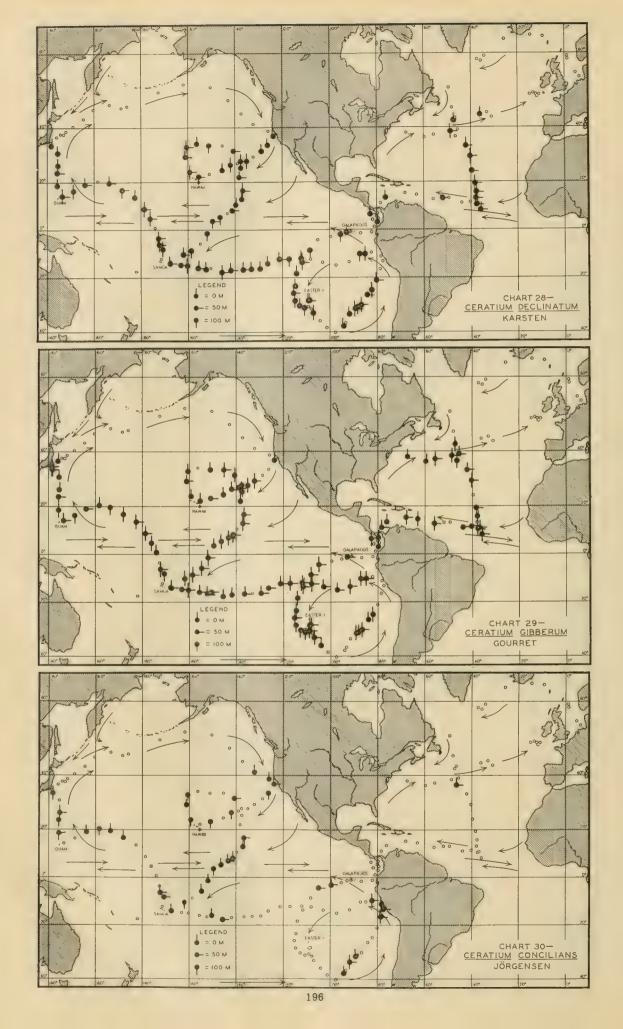


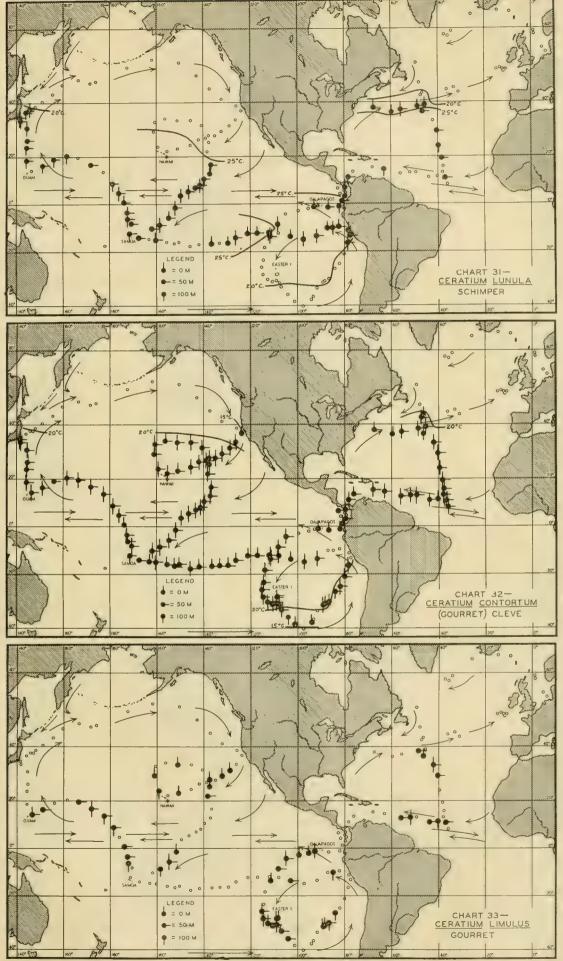


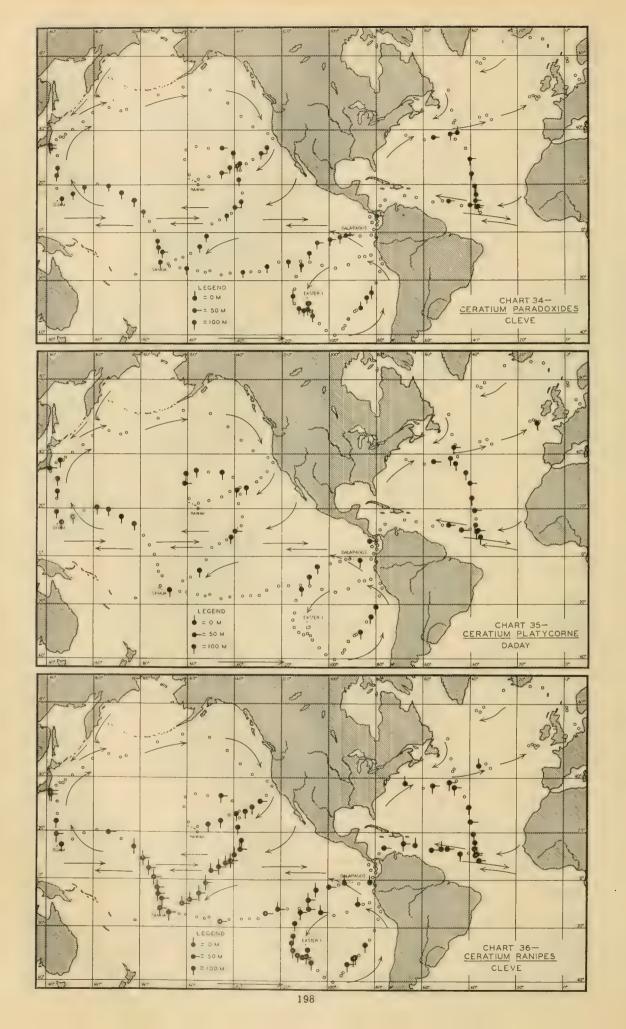


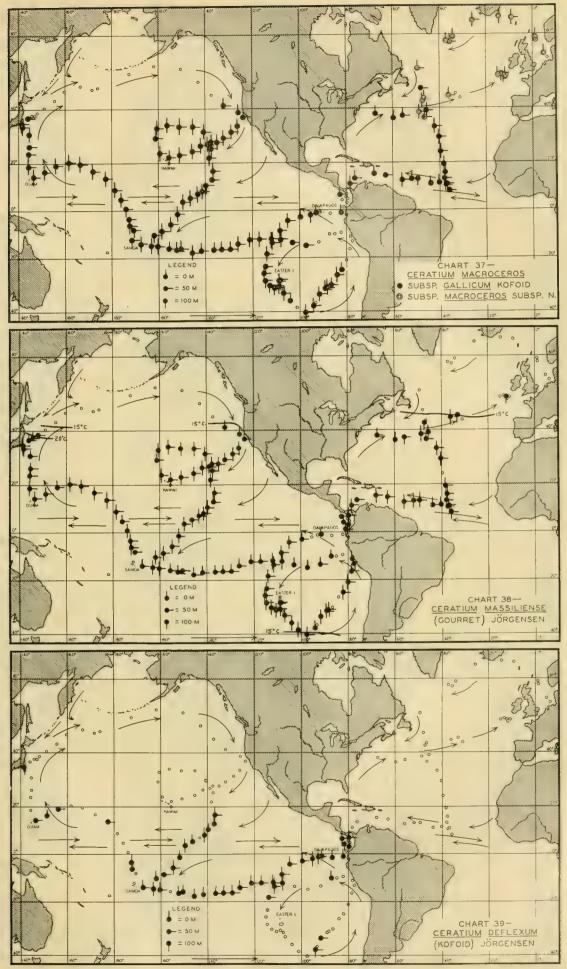


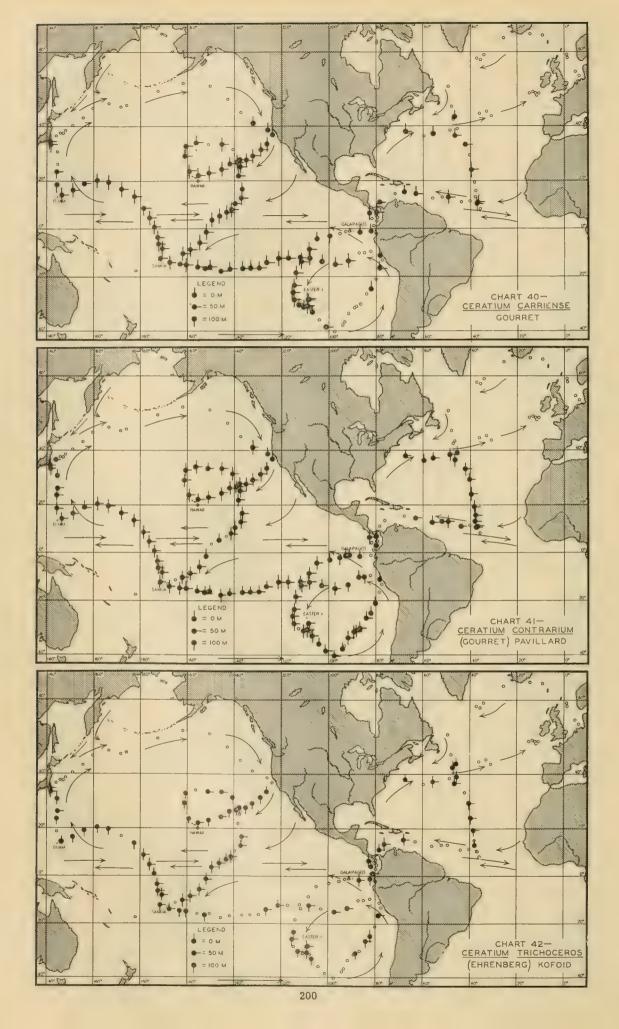


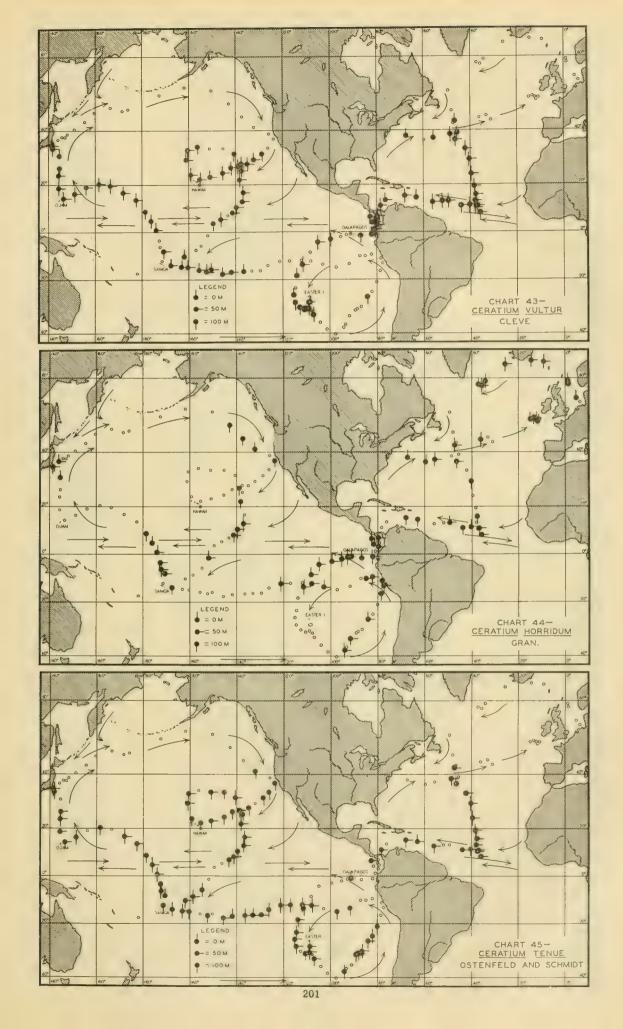


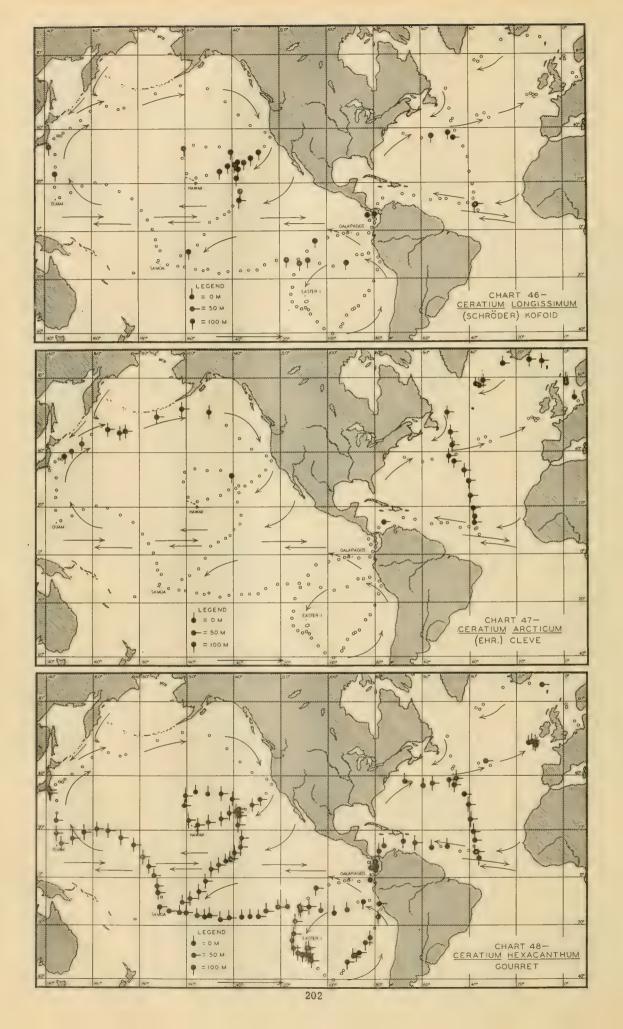


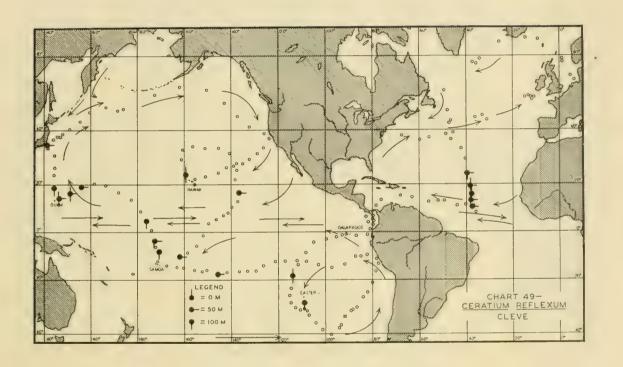


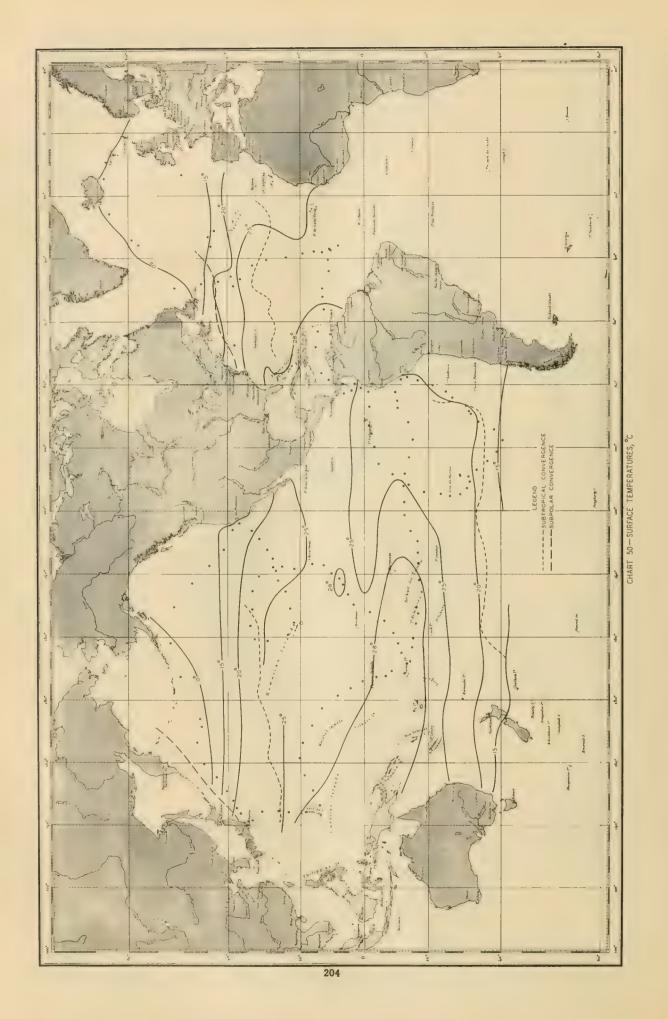


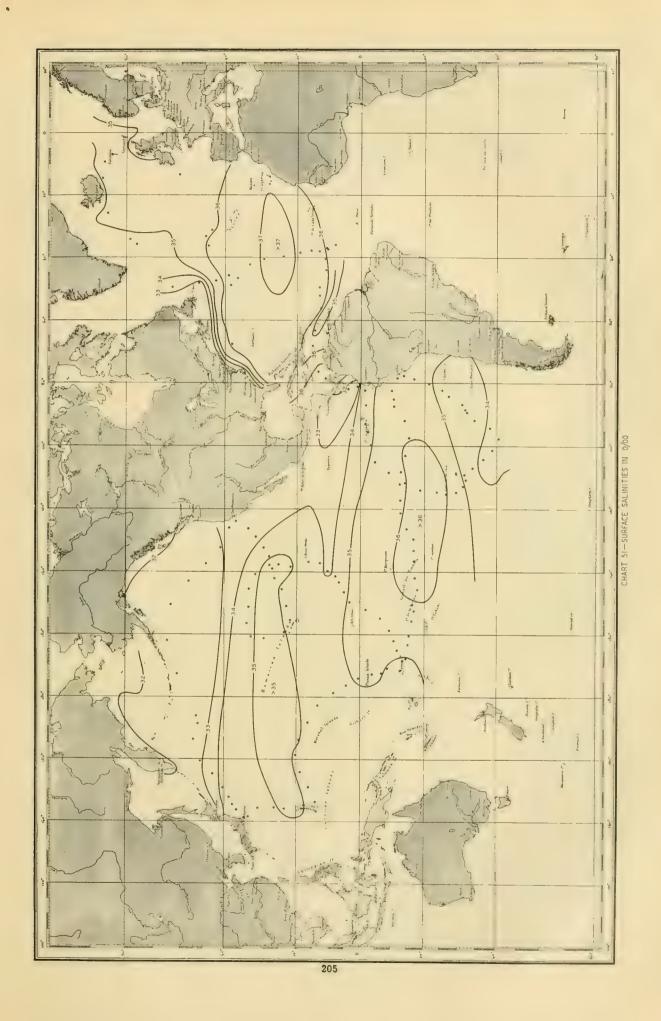


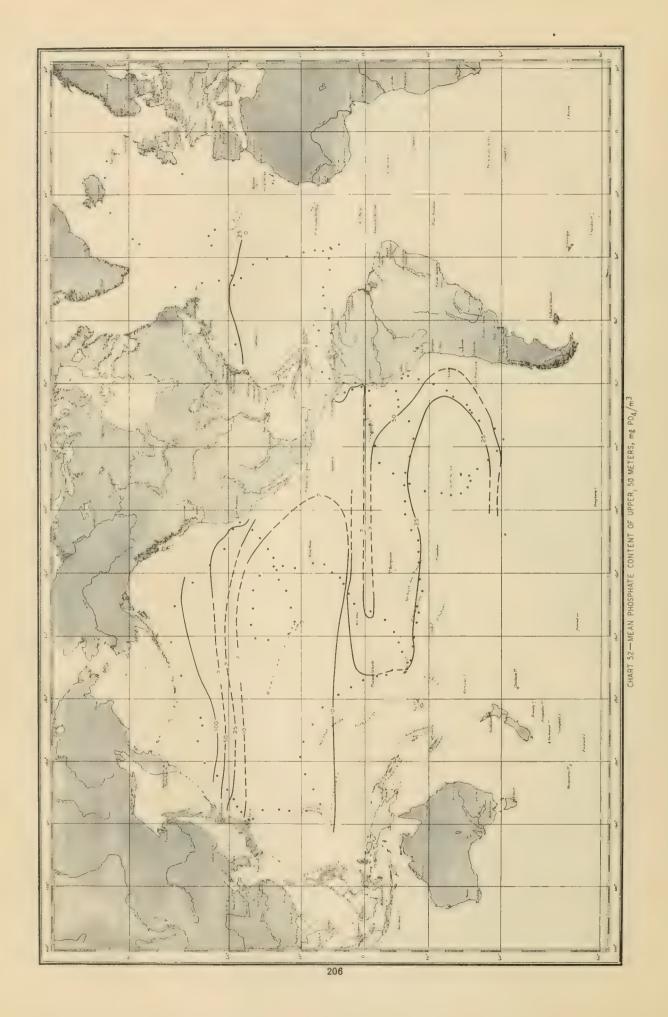


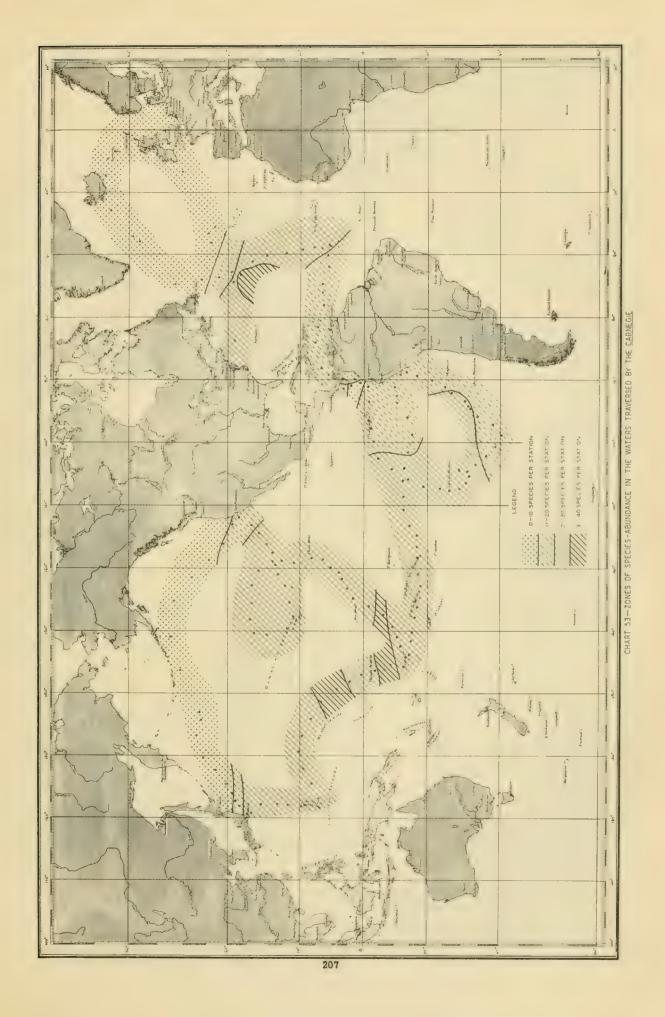


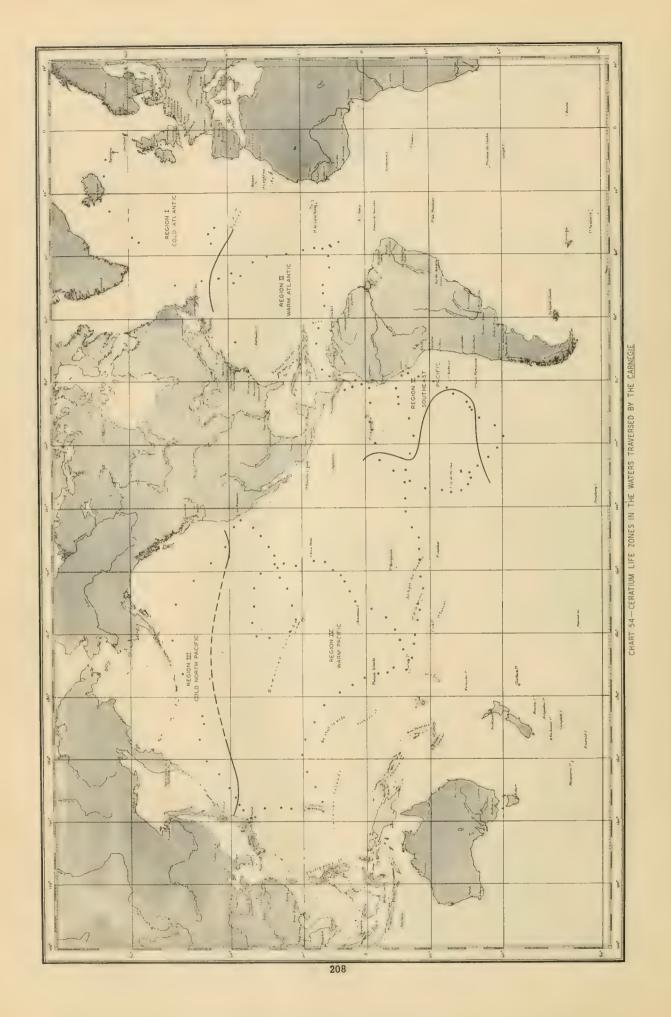












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